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STATE OF ALASKA  
Bill Sheffield, Governor

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## 1982 BRISTOL BAY SALMON TEST FISHING PROJECTS

Edited by:  
Douglas M. Eggers  
and  
Stephen M. Fried

June 1984

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ALASKA DEPARTMENT OF FISH AND GAME  
P.O. Box 3 -2000, Juneau, Alaska 99802

Don W. Collinsworth  
Commissioner

## ADF&G TECHNICAL DATA REPORTS

This series of reports is designed to facilitate prompt reporting of data from studies conducted by the Alaska Department of Fish and Game, especially studies which may be of direct and immediate interest to scientists of other agencies.

The primary purpose of these reports is presentation of data. Description of programs and data collection methods is included only to the extent required for interpretation of the data. Analysis is generally limited to that necessary for clarification of data collection methods and interpretation of the basic data. No attempt is made in these reports to present analysis of the data relative to its ultimate or intended use.

Data presented in these reports is intended to be final, however, some revisions may occasionally be necessary. Minor revisions will be made via errata sheets. Major revisions will be made in the form of revised reports.

1982 BRISTOL BAY SALMON TEST FISHING PROJECTS

A summary of data collected from salmon (*Oncorhynchus* sp.)  
test fishing projects in Bristol Bay, including  
Kvichak, Egegik, Ugashik, and Igushik escapement  
and Port Moller offshore test fishing

Edited by:

Douglas M. Eggers

and

Stephen M. Fried

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
Anchorage, Alaska 99502

June 1984

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## ABSTRACT

Gillnet test fishing was conducted in Bristol Bay offshore waters during 11 June to 10 July 1982 to estimate sockeye (*Oncorhynchus nerka*) and chum (*O. keta*) salmon run timing and total abundance several days before these species actually reached commercial fishing districts. Similarly, gillnet test fishing was conducted within the Kvichak, Egegik, Ugashik, and Igushik Rivers during 18 June to 22 July 1982 to estimate sockeye salmon spawning escapement from the commercial fishery several days before actual counts were available from tower sites further upriver in clear water. Such information is used by managers in determining when to open and close commercial fishing periods so that escapement goals can be met and surplus salmon can be harvested. Various methods of obtaining abundance estimates from test fishing catch data were examined and evaluated to determine which ones produced the most accurate results.

KEY WORDS: sockeye salmon, *Oncorhynchus nerka*, Bristol Bay, test fishing, migratory timing, run abundance estimation.

## FOREWORD

The common goal of Bristol Bay Pacific salmon (*Oncorhynchus* sp.) test fishing projects is to provide fishery managers with estimates of salmon entering (total run) and leaving (escapement) commercial fishing areas before actual catch or escapement statistics became available. Every major river and lake system within Bristol Bay is managed to achieve a specific salmon spawning escapement goal, i.e., the optimum number and distribution of salmon which results in highest salmon production, while maximizing the commercial harvest of salmon in excess of these goals.

Actual spawning counts (and, thus, calculation of total run escapement) cannot be made until salmon pass through commercial fishing areas, located in bays near river mouths, and reach clear water areas, usually several days later, within their parent river system. Therefore, the Port Moller offshore test fishing project was developed to provide estimates of total salmon abundance several days before salmon reach commercial fishing areas, while "inside" test fishing projects (i.e., within the Kvichak, Egegik, Ugashik, and Igushik Rivers) were developed to provide estimates of salmon escapement several days before salmon reach areas where they can be visually counted from towers or aircraft. In general, the basis for calculating estimates of actual salmon abundance from test fishing projects is catch per unit of effort expressed as:

$$\text{Index Points} = 6,000 [C/(F)(T)],$$

where C = number of salmon caught, F = fathoms of gillnet fished, T = minutes of fishing time, and 6,000 = a constant (60 minutes x 100 fathoms) used to convert the index into catch per 100 fathom hours. Test fishing indices are converted to estimates of actual salmon abundance using historical data on total inshore return or escapement per index point. Return or escapement per index point can often be estimated more accurately when factors such as mean salmon size (length or weight) and lag time (the number of days required by salmon to travel from a specific test fishing site to the area in which abundance estimates are required) are taken into account. More detailed discussions of analytical methods are included within the individual papers presented in this report, the fourth in a series of Technical Data Reports concerning Bristol Bay test fishing projects.

## 1982 PORT MOLLER OFFSHORE TEST FISHING

By

Douglas M. Eggers

Alaska Department of Fish and Game  
Division of Commercial Fisheries  
Anchorage, Alaska

### INTRODUCTION

The Bristol Bay offshore test fishing program has been conducted at Port Moller continuously since 1967 (Randall 1977, Meacham 1979, Huttunen 1980). The location, timing, and gear specifications were standardized in 1968, but the primary goal of the project was always to preview the sockeye (*Oncorhynchus nerka*) and chum salmon (*O. keta*) runs to Bristol Bay roughly 1 week prior to their arrival inshore (Mundy and Mathisen 1977). Specific objectives of the 1982 Port Moller project were as follows:

- 1) Forecast the cumulative daily abundance of sockeye and chum salmon entering Bristol Bay;
- 2) Forecast the timing and entry pattern of the sockeye salmon run to the inshore area of Bristol Bay;
- 3) Obtain age data to monitor the performance of the pre-season sockeye forecast; and
- 4) Obtain age, length, and weight data to maintain the historical data base for future scale pattern analysis.

This report presents the results of the 1982 Port Moller sampling, as well as an analysis of the historical performance of various alternative methods of forecasting run strength in-season, based on information derived from the Port Moller sampling. Three alternative methods for forecasting sockeye salmon run strength were considered:

- 1) using the relationship between return per index point (RPI), i.e., catchability, and mean length to estimate daily passage of all age classes pooled, and for 2-ocean and 3-ocean classes separately;
- 2) relating deviations of actual total returns from the pre-season forecast to deviations of actual 2-ocean age composition from the pre-season forecast; and
- 3) estimating inshore returns from a model based on mean length of sockeye salmon in inshore returns (all age classes pooled) and an index of temperature during the period of ocean residence of the returning adults (Huttunen, in prep.).

## METHODS

Port Moller test fishing was conducted along a transect extending from Port Moller offshore to Cape Newenham (Figure 1). Fishing stations were numbered consecutively and were approximately 8 km apart. Station 1 was about 45 km offshore, on the 30.6 m (20 fm) contour, and station 11 was approximately 130 km offshore. In general, odd-numbered stations (6 stations) were fished on the outgoing trip. The vessel anchored overnight and the following day even numbered stations (5 stations) were fished on the return trip. Fishing time was approximately 1 hour for each set with about 1 hour running time to the next station. During 1982 sampling began on 21 June and ended on 15 July (Appendix Tables 1A-3A).

The 22 m fishing vessel the WALTER N was chartered for 1982 offshore test fishing. Three hundred and sixty-six m (200 fm) of 13.7 cm (5-3/8 in) stretch mesh, doubly hung (60 meshes deep) gill net was set and retrieved with a hydraulic reel. (274.5 m or 150 fm of the gear was dyed light green and 91.5 m (50 fm) was dark green). Because the net was picked as it was retrieved, sets with large catches tended to have a longer soak time (Appendix Table 3A). The net was set parallel to the transect and perpendicular to the prevailing direction of salmon movement into Bristol Bay. Catches were standardized to catch per 100 fathom-hours (index points).

Indices from stations missed during the fishing schedule because of inclement weather or mechanical breakdowns were linearly interpolated from the best available data. All sockeye and chum salmon caught were sampled for length, weight, and sex. Mean lengths and weights by station were weighted by index to calculate daily means. Scale samples were also taken from both salmon species. Climatological data were recorded during each set including water surface temperatures, wind direction and velocity, tide stage, air temperature, and cloud cover (Appendix Table 4A). In addition, Loran C coordinates were recorded for each station.

To facilitate the analysis of the historical performance of alternative methods of forecasting in-season run strength based on the information derived from the Port Moller sampling program, the historical data base was collected and put into standard format (Appendix B). Daily indices were allocated to 2-ocean, 3-ocean, and ocean ages pooled categories by the daily age composition from AWL samples. Interpolated indices were allocated to ocean age by the average daily ocean age proportion determined by the average of the daily ocean age proportion weighted by the daily index. Lengths taken during 1968 and 1969 were from snout to fork of tail rather than from mid-eye to fork of tail as has been used since 1970. Therefore, 1968 and 1969 length measurements were converted to mid-eye to fork measurements using relationships provided by Dr. Donald E. Rogers, Fisheries Research Institute, University of Washington, Seattle, Washington:

Mature sockeye salmon:

$$\text{males: } Y = 46.374 + 0.8279 X,$$

$$\text{females: } Y = 17.806 + 0.8946 X;$$

Immature sockeye salmon:

$$\text{sexes pooled: } Y = 4.539 + 0.9264 X$$

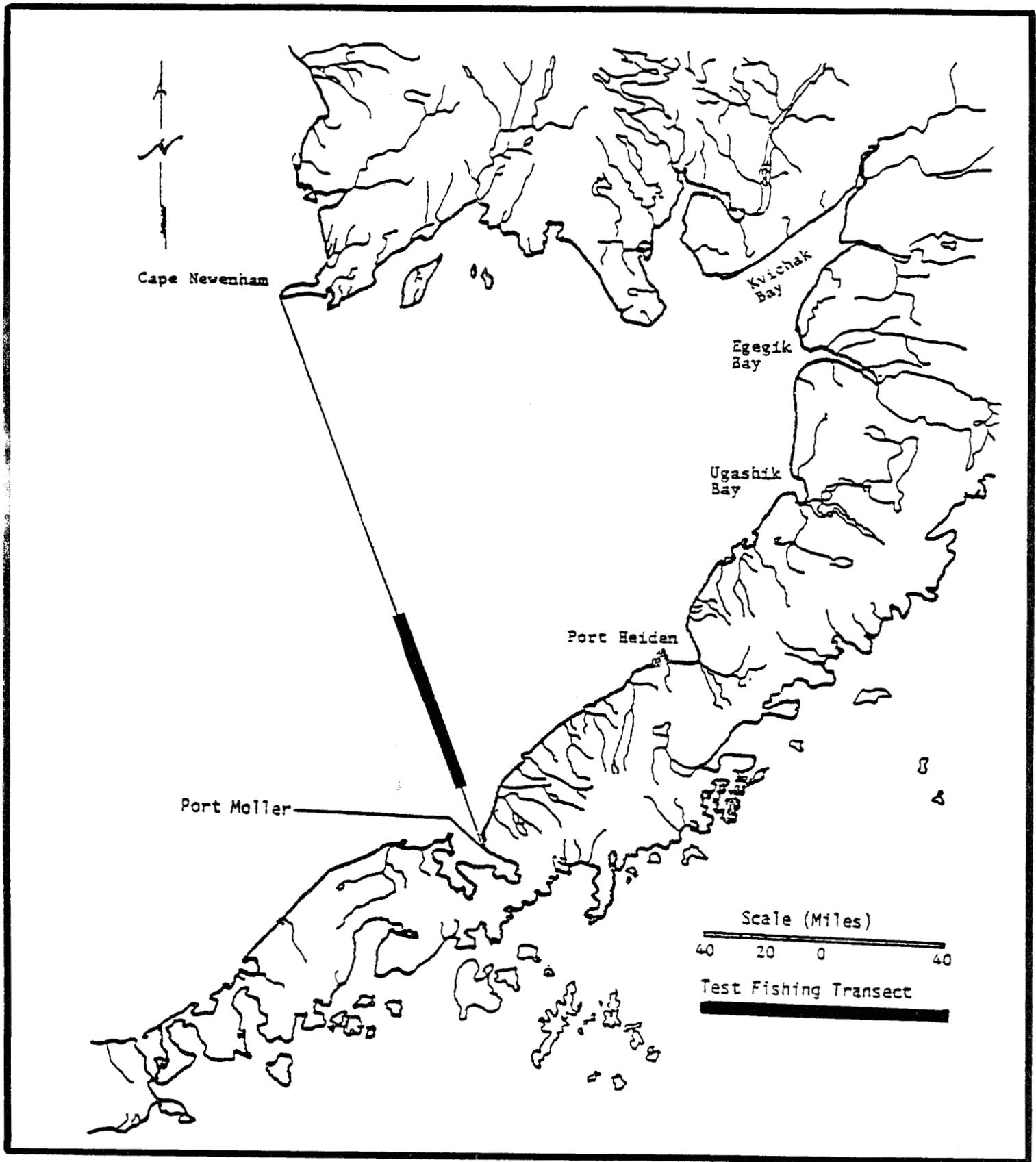


Figure 1. Transect fished during the Port Moller sockeye and chum salmon off-shore gillnet test fishery, 1982.

where Y = length (mm) from mid-eye to fork of tail, and X = length (mm) from snout to fork of tail. Since sockeye salmon taken at Port Moller are not yet fully mature, values were estimated using relationships for both mature and immature sockeye salmon and then averaged.

## RESULTS AND DISCUSSION

### 1982 Port Moller Sampling

In 1982, an estimated 1,295 sockeye and 357 chum salmon were caught during sampling off Port Moller (Tables 1 and 2). These catches generated 758.94 total index points for sockeye salmon and 207.81 total index points for chum salmon, including values interpolated for missed fishing time (Appendix A). Overall mean length and weight of sockeye salmon captured was 567.0 mm and 3.05 kg, respectively (Appendix C).

Initially, estimates of daily passage (i.e., the number of sockeye salmon passing Port Moller in a given day) were made by multiplying daily index by the return per index point or RPI estimated from past data (Table 3 and Figure 2). Mean length must be taken into account since RPI is inversely related to the size of fish. However, observed RPI values for 1980 and 1981 were much higher than observed values for 1968 to 1979. At the start of the 1982 fishing season in Bristol Bay, data from 1980 and 1981 were excluded in fitting the linear regression line relating RPI to mean length, since it was felt that salmon were unusually distributed relative to the sampling transect during these 2 years and that this resulted in low catchability (i.e., high return per index point).

If one assumes that the seventeenth day after the first sockeye salmon were caught at Port Moller was the mid-point of the migration past Port Moller (Mundy and Mathisen 1978) and that the RPI was 16.20 thousand (according to the linear regression model of return per index and mean length), then the in-season forecast of run size was 15.1 million, based on an accumulated 465.8 index points at Port Moller by 27 June. In retrospect the mid-point of the run was very close to 27 June, but the actual run was much higher: 22.13 million. The final estimate of RPI for 1982 was 29.16 thousand. This value was again higher than pre-1980 values and consistent with the recent trend of low catchability of sockeye at Port Moller.

It was discovered, during 1982 sampling, that net color used in the Port Moller program may have changed at the outset of 1980 sampling. The net used during 1982 consisted of 274.5 m (150 fm) of light green mesh and 91.5 m (50 fm) of dark green mesh. The dark green mesh caught a higher number of salmon than did the light green mesh, according to observations by the Port Moller crew. Presumably this was due to the lower visibility of the dark green net in the clear waters off Port Moller. Since 1968 standard gillnets for Port Moller sampling have been dyed dark green.

However, the manufacturer that supplied the mesh the last time gear was rehung sent the wrong color. Logistic difficulties of storing and maintaining nets at Port Moller caused the error to go undetected until this year. The hypothesis of lower catchability of light green mesh is consistent with observations of higher RPI values during 1980-1982.

Table 1. Daily summary of sockeye salmon catch and index, running mean weight and length, and estimated passage for the Port Moller offshore test fishery, 1982.

Date	Sets	Catch	Index	Running Mean		Estimated <sup>2</sup> Daily Passage	Estimated Cumulative Passage
				Weight (kg)	Length (mm) <sup>1</sup>		
6/11	6	27	12.11	3.22	581	350,357	350,357
6/12	4	14	7.21	3.08	575	208,491	558,848
6/13	6	7	3.16	3.10	577	91,278	650,127
6/14	5	26	12.59	3.09	575	364,066	1,014,193
6/15	6	68	29.17	3.13	572	843,720	1,857,914
6/16	5	14	7.16	3.13	572	207,146	2,065,060
6/17	4	40	19.41	3.16	572	561,460	2,626,521
6/18	5	30	14.30	3.18	572	413,746	3,040,267
6/19	6	106	49.79	3.18	573	1,440,327	4,480,595
6/20	2	69*	45.36*	3.17	572	1,312,192*	5,792,787*
6/21	0	40*	40.96*	3.17	572	1,184,914*	6,977,701*
6/22	0	36*	36.53*	3.17	572	1,056,760*	8,034,463*
6/23	6	69	32.12	3.15	571	929,186	8,963,650
6/24	5	64	33.10	3.12	570	957,573	9,921,223
6/25	6	86	47.31	3.10	569	1,368,551	11,289,774
6/26	1	44*	40.00*	3.10	569	1,157,017*	12,446,792*
6/27	2	36*	35.56*	3.10	569	1,028,721*	13,475,514*
6/28	0	20*	20.00*	3.10	569	578,571*	14,054,085*
6/29	6	11	6.11	3.10	569	176,793	14,230,879
6/30	5	63	30.28	3.09	569	876,014	15,106,894
7/01	6	50	25.18	3.08	569	728,473	15,835,368
7/02	0	49*	49.40*	3.08	569	1,429,071*	17,264,440*
7/03	6	160	73.59	3.07	568	2,128,933	19,393,374
7/04	5	26	14.66	3.07	568	424,051	19,817,424
7/05	6	26	13.44	3.08	568	388,765	20,206,190
7/06	4	38	19.57	3.08	568	566,082	20,772,272
7/07	6	46	24.94	3.06	568	721,554	21,493,828
7/08	5	30	15.93	3.05	567	460,959	21,954,786

Totals/  
Ave. 118      1,295      758.94

\* Indices and catches interpolated due to missed fishing time resulting from inclement weather.

<sup>1</sup> Length measured from mid-eye to fork of tail.

<sup>2</sup> Daily passage estimate based on 28,928 inshore returns per index point calculated from least squares fit of accumulative inshore return of 12,971,005 sockeye salmon through 7/8, 430 accumulative Port Moller index points through 6/26, and a lag time of 12 days.

Table 2. Daily summary of chum salmon catch and index, and estimated passage for Port Moller offshore test fishery, 1982.

Date	Sets	Catch	Index	Estimated <sup>1</sup> Daily Passage	Estimated Cumulative Passage
6/11	6	25	12.27	156,950	156,950
6/12	4	9	4.61	58,981	215,931
6/13	6	6	2.84	36,308	252,240
6/14	5	33	17.31	221,402	473,643
6/15	6	10	4.92	62,908	536,551
6/16	5	22	10.47	133,939	670,490
6/17	4	4	1.98	25,264	695,755
6/18	5	22	10.07	128,831	824,587
6/19	6	26	11.87	151,830	976,417
6/20	2	12*	9.92*	126,844 *	1,103,262*
6/21	0	7*	7.00*	89,530 *	1,192,792*
6/22	0	5*	5.00*	63,950 *	1,256,742*
6/23	6	8	4.70	60,171	1,316,914
6/24	5	5	2.63	33,673	1,350,588
6/25	6	19	12.10	154,777	1,505,365
6/26	1	6*	5.52*	70,623 *	1,575,988*
6/27	2	5*	5.00*	63,950 *	1,639,938*
6/28	0	4*	4.00*	51,160 *	1,691,098*
6/29	6	7	3.87	49,546	1,740,645
6/30	5	8	3.81	48,764	1,789,409
7/01	6	11	6.54	83,683	1,873,093
7/02	0	16*	16.00*	204,640 *	2,077,733*
7/03	6	23	11.37	145,415	2,223,149
7/04	5	8	4.62	59,115	2,282,264
7/05	6	21	10.91	139,602	2,421,867
7/06	4	12	5.92	75,736	2,497,603
7/07	6	7	3.86	49,323	2,546,927
7/08	5	16	8.70	111,303	2,658,231
Totals/ Ave.	118	357	207.81		

\* Values and catches interpolated due to missed fishing time because of inclement weather.

<sup>1</sup> Passage estimate based on 12,790 chum salmon inshore returns per Port Moller index.

Table 3. Total inshore return, inshore mean length, Port Moller index, Port Moller mean length, and return per index point of sockeye salmon for all ages pooled, 1982.

Year	Inshore Return (Millions)	Port Moller Index	Inshore Return (thousands) Per Index Point	Port Moller Mean Length (mm)	Inshore <sup>1</sup> Mean Length (mm)
1968	8.00	305.95	26.15	545.53	534.7
1969	19.97	620.97	32.16	537.79	520.2
1970	39.39	823.38	47.84	526.11	510.5
1971	15.82	680.50	23.25	549.37	552.4
1972	5.37	97.72	54.95	553.70	543.7
1973	2.42	339.60	7.13	682.87	572.9
1974	10.94	-	-	-	527.6
1975	24.20	1289.30	18.77	547.13	522.7
1976	11.47	688.60	16.66	552.95	543.5
1977	9.47	782.10	12.11	565.67	557.5
1978	19.65	446.54	44.01	541.25	536.8
1979	40.80	1034.45	39.44	546.53	538.8
1980	62.28	526.78	118.23	542.71	524.6
1981	34.58	1052.15	32.87	566.49	556.0
1982	22.13	758.94	29.16	567.00	560.79

<sup>1</sup> Length measured from mid-eye to fork of tail.

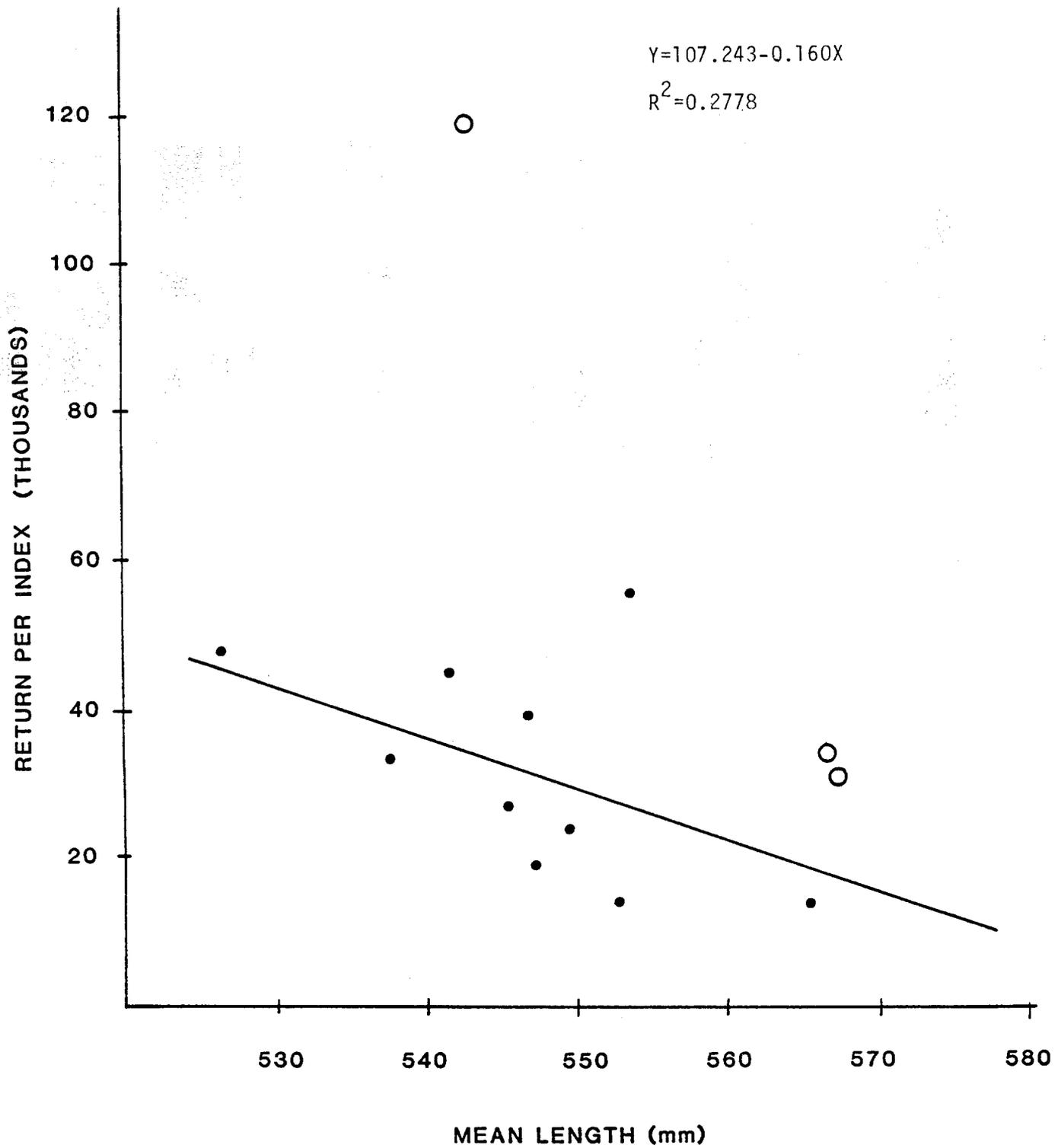


Figure 2. Relationship between mean length (mid-eye to fork of tail) and return per index point for sockeye salmon of all ages pooled, 1968-1982. Data from 1980, 1981, and 1982 (open circles) were considered outliers and were excluded when fitting regression line.

## Lag Time Analysis

The second method of generating an estimate of in-season run strength was the use of lag time analysis. Two models were considered. The first assumed a constant lag time or, equivalently, that the rate of migration of sockeye salmon from Port Moller to inshore fishing districts was constant over time. The second assumed that lag times decreased linearly over time.

### Constant Lag Time Model:

The algorithm for estimating lag time, RPI and daily passage for the constant lag time model was developed by Mundy and Mathisen (1981). A variety of lag times are assumed. For each lag time the return per index that minimizes the sum of the squared deviation between predicted cumulative and observed cumulative inshore return (henceforth called the error function) is given by:

$$RPI(\Delta l) = \frac{\sum_{i=1}^{t+\Delta l} R_{i+\Delta l} - c_i}{\sum_{i=1}^{t+\Delta l} c_i^2}$$

where,  $i$  =  $i$ th day of sampling,  $\Delta l$  = assumed lag time,  $R_{i+\Delta l}$  = cumulative inshore return on day  $i + \Delta l$ , and  $c_i$  = cumulative index points on day  $i$ . The lag time which gives the minimum value for the error function and the corresponding RPI value are used to estimate cumulative migration past Port Moller. A 12 day lag time gave the best fit to 1982 inshore returns (Figure 3). However, the constant lag time model tended to overestimate actual inshore return early in the season and underestimate inshore return late in the season.

### Variable Lag Time Model:

The poor fit of the constant lag time model to the observed temporal pattern of inshore returns suggested that lag time varied during the sampling period. The overestimation of inshore return early in the season and the underestimation of run strength late in the season suggested that lag time was higher early in the season. To test this hypothesis a variable lag time model was used to predict inshore returns.

Lag times were assumed to decrease linearly over the sampling period (Figure 4). The exact lag time function is uniquely determined by two parameters:  $l_1$  and  $l_t$ , that are the lag times at the beginning and end of sampling, respectively. For each pair of lag times the least squares estimate of RPI; the value of the error function, and the predicted cumulative inshore return were computed. Details of the computing algorithm was given in Appendix D.

The lag time function defined by an initial lag time of 16 days and a final lag time of 8 days gave the best fit to 1982 data. The fit was better than that given by the constant lag time model (Figure 3). The standard deviation of predicted inshore return was smaller for the variable lag time model than for the

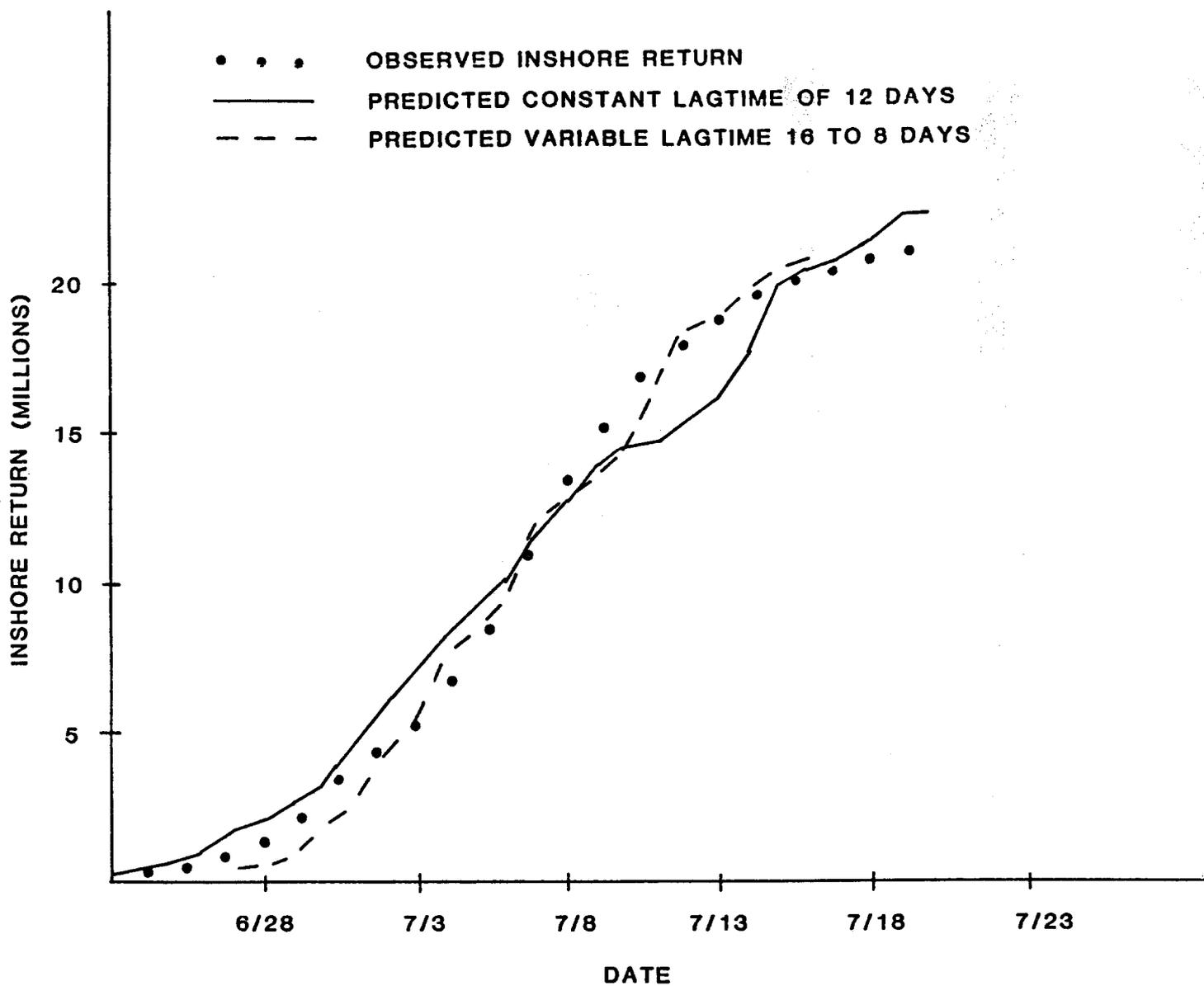


Figure 3. Comparison of predicted temporal patterns of sockeye salmon inshore return, based on constant and variable lag time models, with the observed temporal pattern of inshore return, 1982.

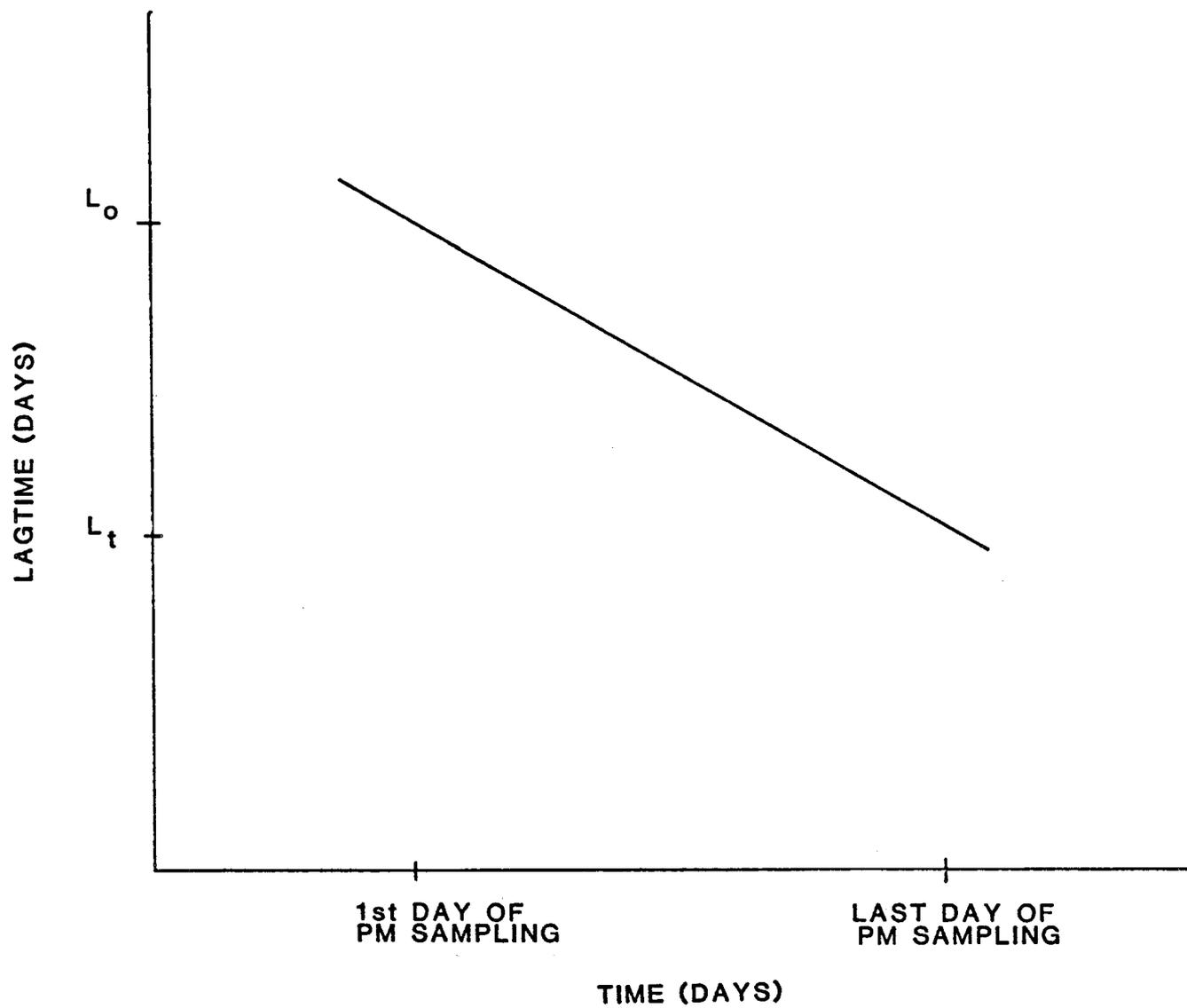


Figure 4. Idealized variable lag time function used in variable lag time model.

the constant lag time model: 201 and 242 thousand sockeye salmon, respectively (Table 4).

#### Historical Performance of Alternative Methods of Forecasting Run Strength

The historical performance of three alternative methods of forecasting run strength based on information taken in the Port Moller test fishery is evaluated below. Those methods are: (1) forecasting in-season run strength based on the past relationship between RPI and mean length of the catch at Port Moller, (2) forecasting in-season run strength based on the deviation between the age composition of the pre-season forecast and the age composition of the catches at Port Moller, and (3) forecasting based on a length-temperature model.

#### Relationship Between RPI and Mean Length:

As mentioned above, initial estimates of run strength were made based on the relationship between RPI and mean length. Here a detailed analysis of this relationship by ocean age classes is presented. In this analysis the data for 1980-1982 were deleted, because of the possible gear color change and the resulting outlier nature of observed catchability for those years (Figure 2). Indices were partitioned into 2-ocean and 3-ocean age components for the years 1968-1982, excluding 1974 when no sampling occurred (Tables 5 and 6). As was the case for ocean ages pooled, RPI values were inversely related to mean length for both 2-ocean and 3-ocean age classes (Figure 5). Although analysis of covariance showed no difference between the common line ( $f_c$ ) and the individual lines ( $f_2, f_3$ ) ( $\alpha = 0.13$ ), a model using  $f_2$  and  $f_3$  was evaluated as well as one using only  $f_c$ .

Three alternative methods of forecasting inshore return based on RPI were evaluated:

- 1) RPI for ocean ages pooled:

$$Y = I_p f_p(L_p)$$

- 2) RPI for separate ocean ages using individual line model:

$$Y = I_2 f_2(L_2) + I_3 f_3(L_3)$$

- 3) RPI for separate ocean ages using common line model:

$$Y = I_2 f_c(L_2) + I_3 f_c(L_3)$$

where,  $Y$  = predicted total inshore return;  $I_p, I_2,$  and  $I_3$  are cumulative indices for total, 2-ocean, and 3-ocean sockeye salmon, respectively;  $L_p, L_2,$  and  $L_3$  are mean lengths for total, 2-ocean, and 3-ocean sockeye salmon, respectively; and  $f_p, f_2, f_3,$  and  $f_c$  are the relationships between RPI and mean length for ocean age classes pooled, 2-ocean individual line, 3-ocean individual line, and the common line model for 2-ocean and 3-ocean fish, respectively.

Comparisons of predicted and observed returns showed differences in precision among alternative forecast methods based on RPI and mean length (Table 7). The presently used method (i.e., method 1 above) based on RPI for ocean ages pooled gave the best precision ( $R^2 = 0.749$ ).

Table 4. Comparison of alternative lag time models used to predict daily passage of sockeye salmon at Port Moller, 1982.

Model	Parameter Estimate	Return Per Index Point	Standard Deviation of Prediction	Cumulative Daily Passage	
				Predicted	Observed
Constant Lag time	12 days	29,950	242,113	22,732,000	21,121,740
Variable Lag time	16 days to 8 days	27,630	201,400	20,977,000	20,075,116

Table 5. Total inshore return, inshore mean length, Port Moller index, Port Moller mean length, and return per index point for 2-ocean sockeye salmon, 1982.

Year	Inshore Return (million)	Port Moller Index	Return per Index Point (thousands)	Port Moller <sup>1</sup> Mean Length (mm)	Inshore <sup>1</sup> Mean Length (mm)
1968	5.13	171.41	29.93	521.20	513.9
1969	16.71	488.61	34.20	526.49	522.4
1970	35.25	667.01	52.85	519.33	505.6
1971	6.23	229.44	27.15	520.53	523.3
1972	2.59	38.02	68.12	525.27	513.5
1973	0.55	68.76	8.00	536.51	518.4
1974	8.66	-	-	-	518.4
1975	18.68	923.24	20.23	533.92	512.7
1976	7.07	382.92	18.46	531.46	523.5
1977	4.42	353.37	11.54	533.66	525.0
1978	12.28	256.04	47.96	519.33	513.0
1979	33.05	805.00	41.06	536.14	531.2
1980	46.15	299.11	154.32	526.96	511.0
1981	15.73	402.17	39.11	537.67	530.8
1982	5.13	141.71	36.20	527.18	515.3
Mean	14.51	373.34	42.08	528.26	518.18
Standard Deviation	13.57	267.35	36.20	6.65	7.52

<sup>1</sup> Length measured from mid-eye to fork of tail.

Table 6. Total inshore return, inshore mean length, Port Moller index, Port Moller mean length, and return per index point for 3-ocean sockeye salmon, 1982.

Year	Inshore Return (millions)	Port Moller Index	Return per Index Point (Thousands)	Port Moller <sup>1</sup> Mean Length (mm)	Inshore <sup>1</sup> Mean Length (mm)
1968	2.87	133.85	21.44	578.50	582.0
1969	3.26	129.53	25.17	580.40	582.3
1970	4.14	157.62	26.27	556.30	559.6
1971	9.59	448.85	21.37	566.54	572.9
1972	2.78	64.28	43.25	570.39	575.4
1973	1.87	270.84	6.90	595.83	586.9
1974	2.28	-	-	-	574.0
1975	5.52	366.06	15.08	574.64	574.2
1976	4.40	305.53	14.40	578.03	577.8
1977	5.05	428.73	11.78	593.16	585.9
1978	7.37	184.52	39.94	572.66	584.4
1979	7.75	227.92	34.00	583.85	577.7
1980	16.13	226.16	71.32	567.69	568.0
1981	18.85	647.08	29.13	584.11	577.5
1982	17.00	604.98	28.10	576.87	576.4
Mean	7.26	299.71	27.73	577.07	577.01
Standard Deviation	5.66	178.44	16.28	10.45	7.11

<sup>1</sup> Length measured from mid-eye to fork of tail.

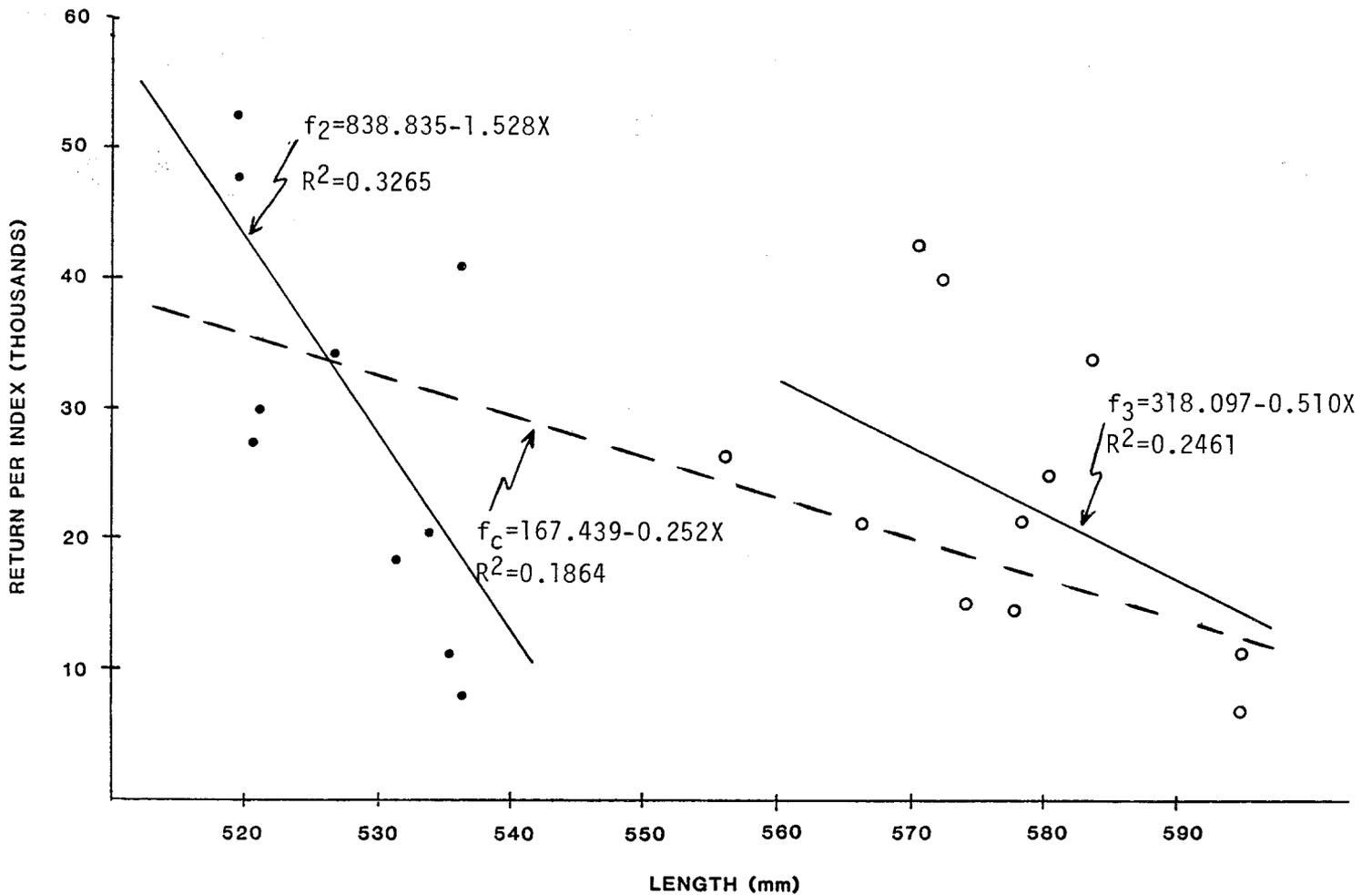


Figure 5. Relationship between return per index point and mean length (mid-eye to fork of tail) for 2-ocean (closed circles) and 3-ocean (open circles) sockeye salmon, 1968-1979. Regression lines fitted to 2-ocean ( $f_2$ ) and 3-ocean ( $f_3$ ) sockeye salmon data separately and to all data combined ( $f_c$ ).

Table 7. Comparisons of predicted inshore sockeye salmon returns obtained from these alternative models of return per index point in relation to mean length, 1968-1982.

Year	Observed Return (millions)			Predicted Return (Millions)								
	Total	2-Ocean	3-Ocean	Model 1	Model 2			Model 3				
				Total	Total	2-Ocean	3-Ocean	Total	2-Ocean	3-Ocean		
1968	8.00	5.13	2.87	9.91	10.36	7.28	3.08	9.07	6.18	2.89		
1969	19.97	16.71	3.26	23.49	19.66	16.81	2.85	22.70	19.96	2.74		
1970	39.39	35.25	4.14	35.66	34.06	28.65	5.41	28.65	24.36	4.29		
1971	15.82	6.23	9.59	20.21	23.04	9.98	13.06	19.36	8.31	11.05		
1972	5.37	2.59	2.78	2.60	2.79	1.05	1.74	2.85	1.33	1.52		
1973	2.42	0.55	1.87	2.08	5.15	1.31	3.84	6.88	2.21	4.67		
1974	-	-	-	-	-	-	-	-	-	-		
1975	24.20	18.68	5.52	40.31	30.43	21.29	9.14	38.58	30.32	8.26		
1976	11.47	7.07	4.40	18.72	17.37	10.27	7.10	19.45	12.81	6.64		
1977	9.47	4.42	5.05	14.27	14.95	8.29	6.66	19.31	11.63	7.68		
1978	19.65	12.28	7.37	15.80	16.41	11.62	4.79	13.61	9.35	4.26		
1979	40.80	33.05	7.75	32.78	20.45	15.83	4.62	31.61	25.98	5.63		
1980	62.28	46.15	16.13	<18.10>	<16.53>	<10.08>	<6.45>	<15.85>	<10.35>	<5.50>		
1981	34.58	15.73	18.85	<18.60>	<20.01>	<6.97>	<13.04>	<25.89>	<12.83>	<13.06>		
1982	22.13	5.13	17.00	<12.43>	<18.23>	<4.50>	<13.73>	<16.90>	<4.15>	<12.75>		
R <sup>2</sup> (Excluding 1980-1982)				0.7493	0.6317	0.7622	0.4980	0.6211	0.7137	0.4777		

#### Deviations of Percentage of 2-Ocean Sockeye Salmon at Port Moller from Percentage of 2-Ocean Sockeye Salmon in Forecasts:

In past years the percentage of 2-ocean sockeye salmon in the Port Moller catches was very close to the percentage 2-ocean sockeye salmon in inshore returns (Figure 6).

The proportion of 2-ocean sockeye salmon at Port Moller averages about 6% lower than that of the inshore return, reflecting the lower catchability of the smaller 2-ocean sockeye salmon in the Port Moller gill nets. The  $R^2$  for predicting the proportion of 2-ocean sockeye salmon based on the proportion of 2-ocean sockeye salmon in Port Moller catches is 0.97. The ability to predict the ocean age composition of the inshore return so accurately early in the season has potential for early in-season evaluation of the pre-season forecast.

The following is an analysis of the relationship between the error in the forecasted ocean age composition, which is known accurately early in the season based on Port Moller sampling, and the error in forecasted run size (Table 8). The latter is not known accurately until well into the season. The absolute deviation of the forecasted run size (forecast - observed) was plotted against the absolute deviation of the forecasted 2-ocean age composition (forecast - observed) (Figure 7). The correlation between those two quantities was 0.507, and suggested that when 2-ocean age composition was lower than forecasted run size also tended to be lower than forecasted. This result holds only for extreme (greater than 10%) errors in forecasted 2-ocean age proportion. If the error in forecasted ocean age was low (less than 10%), there was little indication of error trend in the forecasted run size (Figure 7). In all situations where forecasted 2-ocean age proportion was much greater than that realized, the run came in lower than forecasted.

#### Length-Temperature Model:

There appears to be density dependent growth during the ocean phase of sockeye salmon life history (Huttunen 1979). There also appears to be a temperature effect upon growth during the marine phase as well. A positive relationship between temperature during the marine phase, as indexed by the sum of the mean June air temperature at Cold Bay during the two summers preceding maturation, and run size was found along with an inverse relationship between mean length of returning sockeye salmon and run size. The following model was fitted to historical data (1965-1982):

$$\ln Y = A + B_1 \ln X_1 + B_2 \ln X_2,$$

where  $Y$  = total inshore return;  $A$ ,  $B_1$  and  $B_2$  = regression coefficients;  $X_1$  = mean length of total inshore return; and  $X_2$  = Cold Bay mean June air temperatures. Regressing return against the above dependent variables for the years 1965 to 1982 yielded estimates of  $A = 18.7888$ ,  $B_1 = 10.7912$ , and  $B_2 = 11.5179$ .

Application of this model for forecasting run strength in-season requires data on the mean length of sockeye salmon in the inshore return. Therefore, the relationship between mean length of return and mean length of Port Moller samples was used to estimate mean length of inshore return in-season (Figure 8). Forecasts of run strength were then made based on the above length-temperature model (Table 9). The  $R^2$  for this forecast procedure was 0.693.

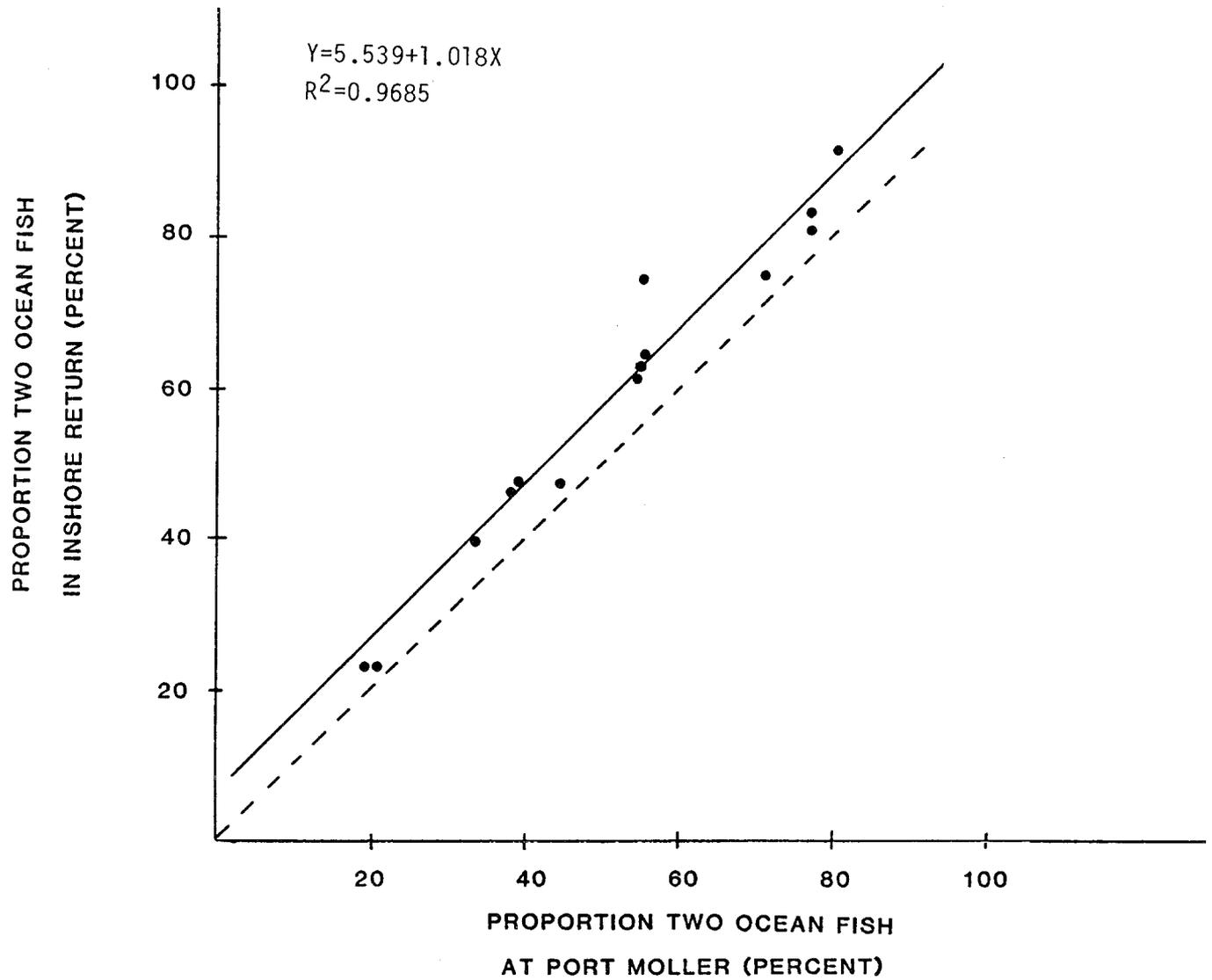


Figure 6. Relationship between the proportion of 2-ocean sockeye salmon caught at Port Moller and the proportion of 2-ocean sockeye salmon in the inshore return, 1968-1982.

Table 8. Deviations of observed from forecasted total inshore return and of observed from forecasted percent of 2-ocean sockeye in total inshore returns, 1961-1982.

Year	Total Inshore Return (Millions)			2-Ocean Return (percent of of total)		
	Forecast	Observed	Deviation	Forecast	Observed	Deviation
1961	22.0	18.1	3.9	60.3	32.6	27.7
1962	9.7	10.4	-0.7	41.2	68.0	-26.8
1963	15.6	6.9	8.7	48.8	54.9	-6.1
1964	17.4	10.9	6.5	80.5	78.1	2.4
1965	27.8	53.1	-25.3	77.7	90.4	-12.7
1966	31.3	17.5	13.8	61.9	24.1	37.8
1967	13.8	10.3	3.5	74.1	67.1	7.0
1968	10.4	8.0	2.4	62.9	64.1	-1.2
1969	21.3	20.0	1.3	75.5	83.7	-8.2
1970	55.8	39.4	16.4	87.2	89.5	-2.3
1971	15.2	15.8	-0.6	43.1	39.4	3.9
1972	9.7	5.4	4.3	58.4	48.2	11.2
1973	6.2	2.4	3.8	43.0	22.7	20.3
1974	5.0	10.9	-5.9	71.7	79.2	-7.5
1975	12.0	24.2	-12.2	69.8	77.2	-7.4
1976	11.1	11.5	-0.4	47.2	61.6	-14.4
1977	8.4	9.5	-1.1	49.1	46.7	2.4
1978	11.5	19.7	-8.4	67.7	62.5	5.2
1979	22.7	39.8	-17.7	75.1	81.0	-5.9
1980	54.5	62.3	-7.8	74.6	74.1	0.5
1981	26.7	34.6	-7.9	48.4	45.5	2.9
1982	34.6	22.1	12.4	63.5	23.2	40.3

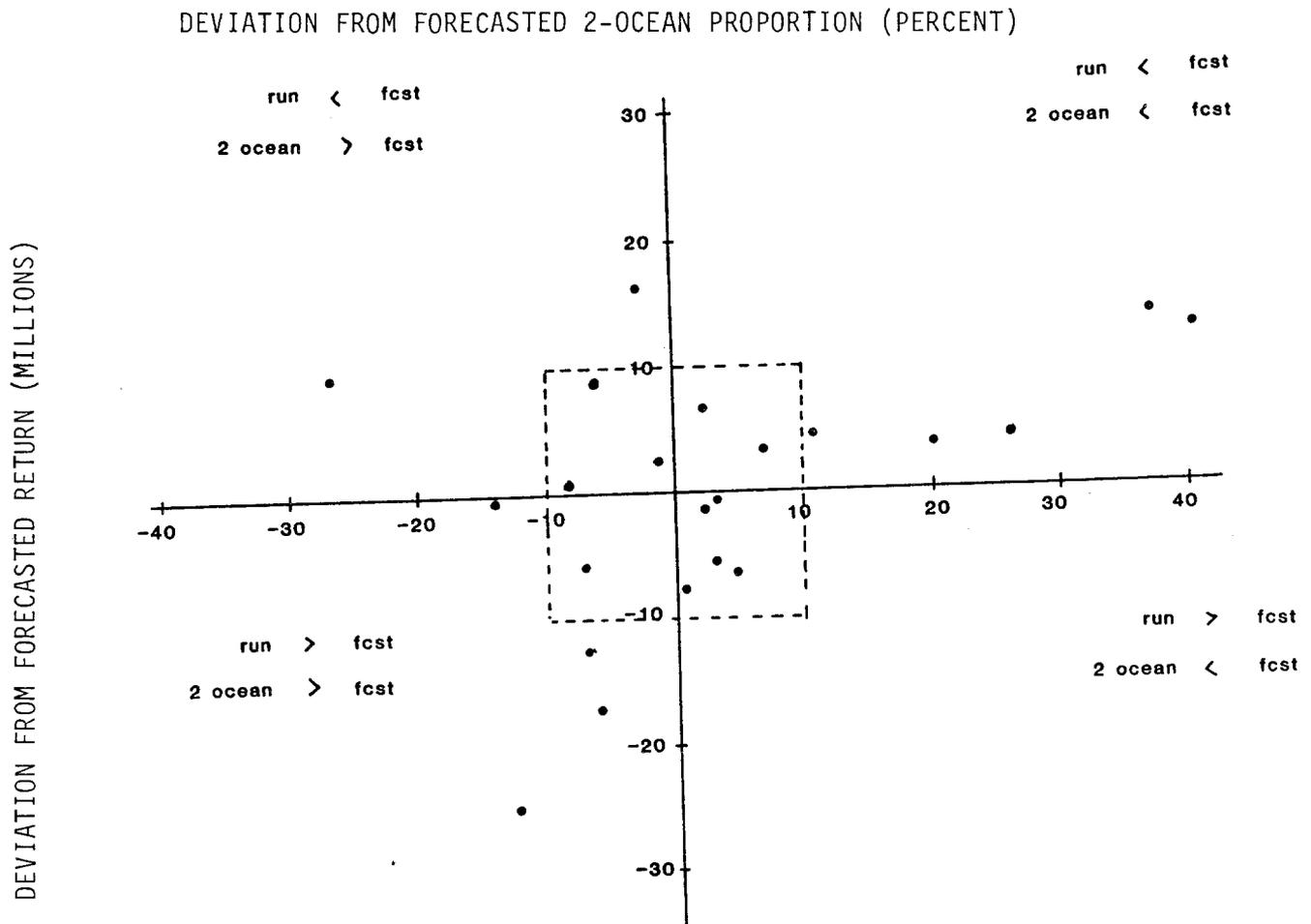


Figure 7. Relationship between deviations from the forecast (observed minus forecasted values) for 2-ocean proportion and total run size of sockeye salmon, 1961-1982.

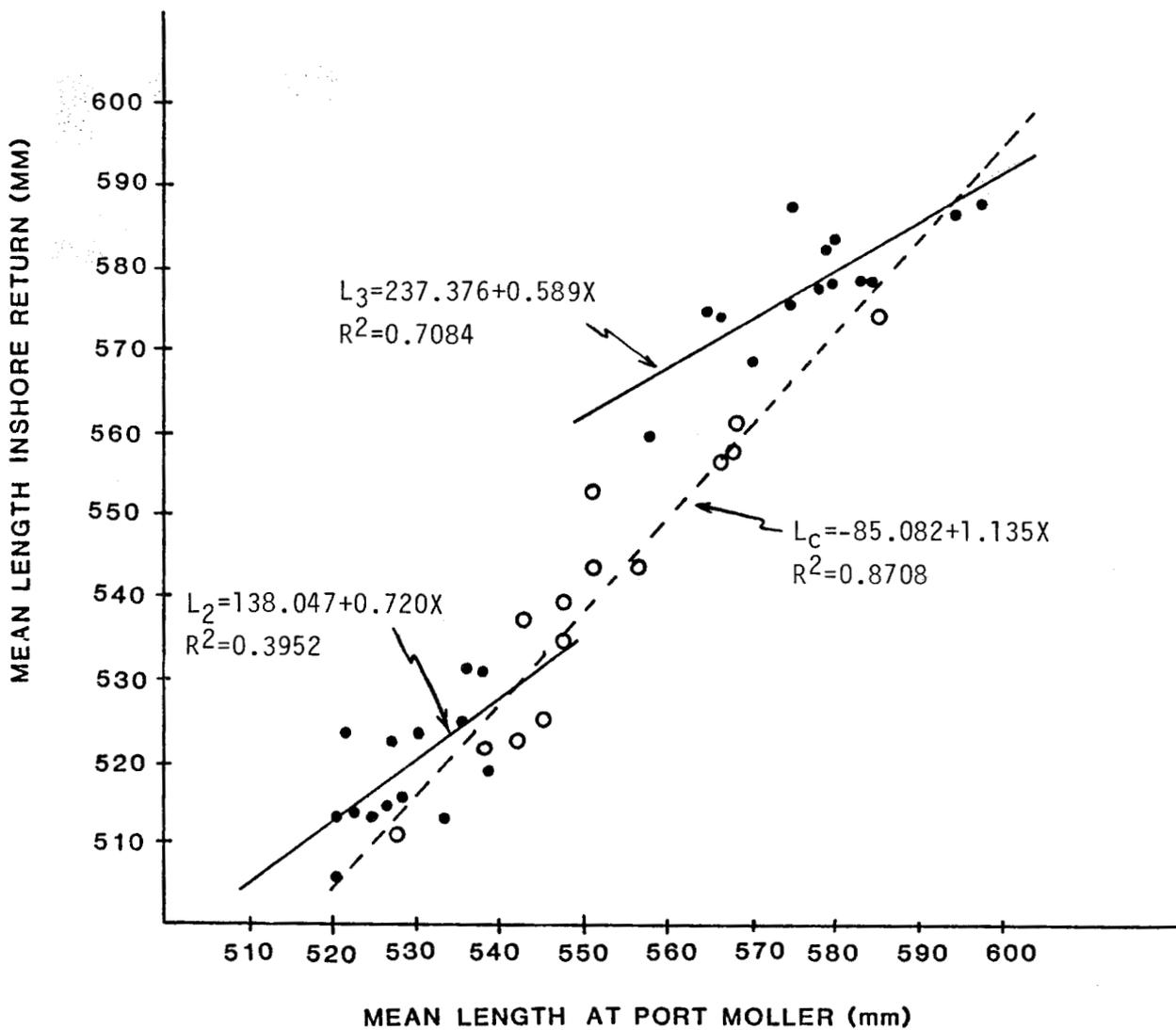


Figure 8. Relationship between mean length (mid-eye to fork of tail) of sockeye salmon caught at Port Moller and sampled from the inshore return, 1968-1982. Regression lines fitted to 2-ocean (L<sub>2</sub>), 3-ocean (L<sub>3</sub>), and to overall (L<sub>C</sub>; open circles) mean length data.

Table 9. In-season estimates of sockeye salmon returns based on predicted inshore mean length from Port Moller sampling and length-temperature model of run strength, 1968-1982.

Year	Mean Length <sup>1</sup> at Port Moller (mm)	Predicted <sup>1</sup> Mean Length Inshore (mm)	Mean June Air Temperature at Cold Bay (C)	Predicted Inshore Return (millions)	Observed Inshore Return (millions)
1968	545.5	534.0	91.0	19.53	8.00
1969	537.8	525.2	92.2	27.17	19.97
1970	526.1	511.9	92.3	36.25	39.39
1971	549.4	538.3	94.7	28.32	15.82
1972	553.7	543.2	88.3	11.47	5.37
1973	582.9	576.4	82.1	2.62	2.42
1974			84.1		
1975	547.1	535.8	88.3	13.31	24.20
1976	553.0	542.4	92.0	18.71	11.47
1977	565.7	556.8	90.8	12.12	9.47
1978	541.3	529.1	94.2	32.10	19.65
1979	546.5	535.1	96.6	37.98	40.80
1980	542.7	530.8	97.6	46.69	62.28
1981	566.5	557.8	95.9	22.33	34.58
1982	567.0	558.3	93.5	16.49	22.13

<sup>1</sup> Length measured from mid-eye to fork of tail.

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APPENDIX A

Appendix Table 1A. 1982 Port Moller sockeye index summary by station (interpolated values indicated by astrices).

Date	Station											Total
	1	2	3	4	5	6	7	8	9	10	11	
6/11	.56	-	0.00	-	0.00	-	11.56	-	0.00	-	0.00	12.11
6/12	-	0.00	-	2.46	-	1.62	-	2.14	-	.98	-	7.21
6/13	0.00	-	0.00	-	.47	-	2.69	-	0.00	-	0.00	3.16
6/14	-	3.72	-	.95	-	5.81	-	2.11	-	0.00	-	12.59
6/15	1.92	-	2.44	-	0.00	-	23.75	-	.50	-	.56	29.17
6/16	-	3.68	-	.58	-	1.53	-	1.37	-	0.00	-	7.16
6/17	.95	-	2.46	-	2.61	-	13.39	-	-	-	-	19.41
6/18	-	0.00	-	.50	-	1.59	-	10.87	-	1.34	-	14.30
6/19	.92	-	10.82	-	3.75	-	15.87	-	18.43	-	0.00	49.79
6/20	-	14.09	-	7.06	-	-	-	-	-	-	-	45.36*
6/21	-	-	-	-	-	-	-	-	-	-	-	40.96*
6/22	-	-	-	-	-	-	-	-	-	-	-	36.53*
6/23	.55	-	.57	-	0.00	-	9.23	-	21.78	-	0.00	32.12
6/24	-	6.06	-	.51	-	8.65	-	12.20	-	5.69	-	33.10
6/25	0.00	-	10.43	-	.58	-	12.55	-	19.46	-	4.29	47.31
6/26	-	4.70	-	-	-	-	-	-	-	-	-	40.00*
6/27	-	-	0.00	-	-	-	-	-	-	-	-	35.56*
6/28	-	-	-	-	-	-	-	-	-	-	-	20.00*
6/29	.55	-	.56	-	.56	-	0.00	-	4.44	-	0.00	6.11
6/30	-	3.93	-	.56	-	1.15	-	23.08	-	1.57	-	30.28
7/01	.53	-	0.00	-	1.58	-	1.61	-	20.83	-	.64	25.18
7/01	-	-	-	-	-	-	-	-	-	-	-	49.40*
7/03	0.00	-	4.70	-	7.69	-	38.33	-	20.69	-	2.18	73.59
7/04	-	1.65	-	1.08	-	.59	-	2.45	-	8.89	-	14.66
7/05	0.00	-	0.00	-	0.00	-	7.12	-	3.24	-	3.08	13.44
7/06	-	-	-	.55	-	6.32	-	10.34	-	2.36	-	19.57
7/07	0.00	-	0.00	-	12.00	-	2.31	-	7.78	-	2.86	24.94
7/08	-	2.29	-	1.18	-	9.74	-	1.61	-	1.12	-	15.93
Total	5.98	40.11	31.97	15.42	29.24	37.00	138.39	66.16	117.14	21.95	13.60	758.93
%	1.6	7.8	6.2	3.0	5.7	7.2	26.8	12.8	22.7	4.2	2.6	100.

Appendix Table 2A. 1982 Fort Moller chum salmon index summary by station (interpolated values indicated by astrices).

Date	Station											Total
	1	2	3	4	5	6	7	8	9	10	11	
6/11	0.00	-	0.00	-	0.00	-	4.89	-	4.66	-	2.73	12.27
6/12	-	-	-	.49	-	1.08	-	1.07	-	1.97	-	4.61
6/13	0.00	-	0.00	-	0.00	-	2.24	-	0.00	-	.60	2.84
6/14	-	0.00	-	0.00	-	1.94	-	14.74	-	.64	-	17.31
6/15	.48	-	.98	-	.98	-	0.00	-	2.48	-	0.00	4.92
6/16	-	0.00	-	.58	-	2.54	-	4.12	-	3.23	-	10.47
6/17	0.00	-	.98	-	0.00	-	.99	-	-	-	-	1.98
6/18	-	0.00	-	0.00	-	0.00	-	4.25	-	5.82	-	10.07
6/19	1.38	-	1.97	-	.54	-	1.98	-	6.00	-	0.00	11.87
6/20	-	.91	-	1.01	-	-	-	-	-	-	-	9.92*
6/21	-	-	-	-	-	-	-	-	-	-	-	7.00*
6/22	-	-	-	-	-	-	-	-	-	-	-	5.00*
6/23	0.00	-	0.00	-	0.00	-	0.00	-	1.78	-	2.93	4.70
6/24	-	0.00	-	0.00	-	1.08	-	0.00	-	1.55	-	2.63
6/25	.54	-	2.09	-	0.00	-	0.00	-	1.62	-	7.86	12.10
6/26	-	.52	-	-	-	-	-	-	-	-	-	5.52*
6/27	-	-	-	-	-	-	-	-	-	-	-	5.00*
6/28	-	-	-	-	-	-	-	-	-	-	-	4.00*
6/29	1.09	-	.56	-	0.00	-	0.00	-	2.22	-	0.00	3.87
6/30	-	0.00	-	0.00	-	0.00	-	2.77	-	1.04	-	3.81
7/01	0.00	-	0.00	-	1.58	-	0.00	-	.50	-	4.47	6.54
7/02	-	-	-	-	-	-	-	-	-	-	-	16.00*
7/03	.55	-	0.00	-	1.54	-	2.50	-	5.69	-	1.09	11.37
7/04	-	1.10	-	.54	-	.59	-	1.84	-	.56	-	4.62
7/05	0.00	-	.56	-	0.00	-	1.53	-	2.16	-	6.67	10.91
7/06	-	-	-	.55	-	0.00	-	2.07	-	3.31	-	5.92
7/07	0.00	-	0.00	-	1.57	-	.58	-	0.00	-	1.71	3.86
7/08	-	2.29	-	.59	-	2.56	-	2.14	-	1.12	-	8.70
<b>TOTAL</b>	<b>4.04</b>	<b>4.82</b>	<b>7.13</b>	<b>3.75</b>	<b>6.20</b>	<b>9.79</b>	<b>14.71</b>	<b>33.00</b>	<b>27.10</b>	<b>19.24</b>	<b>28.05</b>	<b>207.84</b>
<b>%</b>	<b>2.6</b>	<b>3.1</b>	<b>4.5</b>	<b>2.4</b>	<b>3.9</b>	<b>6.2</b>	<b>9.3</b>	<b>20.9</b>	<b>17.2</b>	<b>12.2</b>	<b>17.8</b>	<b>100.</b>

Appendix Table 3A. Port Moller offshore test fishing sockeye and chum salmon catch, fishing time, index, mean weight (kg), and mean length (mm) by set and station, 1982.

Date	Set No.	Station	Gear Length (Fathoms)	Mean Fishing Time (Min)	Sockeye Catch	Test Fishing Index (Daily)	Mean Weight	Mean Length	Chum Catch	Test Fishing Index (Daily)	Tide
6/11	1	1	200	54.000	1	.6	2.62	563.00	0	0.0	3
6/11	2	3	200	46.500	0	0.0	0.00	0.00	0	0.0	2
6/11	3	5	200	21.500	0	0.0	0.00	0.00	0	0.0	4
6/11	4	7	200	67.500	26	11.6	3.25	582.00	11	4.9	4
6/11	5	9	200	58.000	0	0.0	0.00	0.00	9	4.7	3
6/11	6	11	200	55.000	0	0.0	0.00	0.00	5	2.7	3
6/12	7	10	200	61.000	2	1.0	2.98	569.00	4	2.0	3
6/12	8	8	200	56.000	4	2.1	2.86	574.00	2	1.1	4
6/12	9	6	200	55.500	3	1.6	2.57	549.00	2	1.1	4
6/12	10	4	200	61.000	5	2.5	3.05	571.00	1	.5	4
6/13	11	1	200	61.000	0	0.0	0.00	0.00	0	0.0	3
6/13	12	3	200	49.000	0	0.0	0.00	0.00	0	0.0	3
6/13	13	5	200	64.000	1	.5	2.78	575.00	0	0.0	4
6/13	14	7	200	67.000	6	2.7	3.30	589.00	5	2.2	4
6/13	15	9	200	58.000	0	0.0	0.00	0.00	0	0.0	3
6/13	16	11	200	50.000	0	0.0	0.00	0.00	1	.6	3
6/14	17	10	200	47.000	0	0.0	0.00	0.00	1	.6	3
6/14	18	8	200	57.000	4	2.1	2.84	556.00	28	12.5	3
6/14	19	6	200	62.000	12	5.8	3.22	583.00	4	1.9	4
6/14	20	4	200	63.000	2	.9	2.34	534.00	0	0.0	4
6/14	21	2	200	64.500	8	3.7	3.17	571.00	0	0.0	4
6/15	22	1	200	62.500	4	1.9	2.88	549.00	1	.5	3
6/15	23	3	200	61.500	5	2.4	2.84	558.00	2	1.0	3
6/15	24	5	200	61.000	0	0.0	0.00	0.00	2	1.0	2
6/15	25	7	200	72.000	57	23.7	3.21	571.00	0	0.0	4
6/15	26	9	200	60.500	1	.5	3.80	595.00	5	2.5	3
6/15	27	11	200	53.500	1	.6	3.25	571.00	0	0.0	3
6/16	28	10	200	65.000	0	0.0	0.00	0.00	7	3.2	3
6/16	29	8	200	65.500	3	1.4	3.26	578.00	9	4.1	3
6/16	30	6	200	59.000	3	1.5	3.71	602.00	5	2.5	3
6/16	31	4	200	52.000	1	.6	4.00	604.00	1	.6	4
6/16	32	2	200	57.000	7	3.7	2.93	565.00	0	0.0	1
6/17	33	1	200	63.000	2	.9	2.36	538.00	0	0.0	4
6/17	34	3	200	61.000	5	2.5	2.90	562.00	2	1.0	3
6/17	35	5	200	69.000	6	2.6	3.06	571.00	0	0.0	4
6/17	36	7	200	60.500	27	13.4	3.45	575.00	2	1.0	3
6/18	37	10	200	67.000	3	1.3	3.33	570.00	13	5.8	1
6/18	38	8	200	63.500	23	10.9	3.31	565.00	9	4.2	3
6/18	39	6	200	56.500	3	1.6	3.22	586.00	0	0.0	3
6/18	40	4	200	60.000	1	.5	3.50	602.00	0	0.0	2
6/18	41	2	200	57.500	0	0.0	0.00	0.00	0	0.0	3
6/19	42	1	200	65.000	2	.9	3.65	582.00	3	1.4	4
6/19	43	3	200	61.000	22	10.8	3.30	585.00	4	2.0	3
6/19	44	5	200	56.000	7	3.7	3.00	565.00	1	.5	3
6/19	45	7	200	60.500	32	15.9	3.25	582.00	4	2.0	4

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Appendix Table 3A. (Continued)

Date	Set No.	Station	Gear Length (Fathoms)	Mean Fishing Time (Min)	Sockeye Catch	Test Fishing Index (Daily)	Mean Weight	Mean Length	Chum Catch	Test Fishing Index (Daily)	Tide
6/19	46	9	200	70.000	43	18.4	3.10	571.00	14	6.0	4
6/19	47	11	200	66.000	0	0.0	0.00	0.00	0	0.0	4
6/20	48	2	200	66.000	31	14.1	2.90	555.00	2	.9	4
6/20	49	4	200	59.500	14	7.1	3.28	581.00	2	1.0	3
6/20	0	0	100	60.000	24	24.2	0.00	0.00	8	0.0	0
6/21	0	0	100	60.000	40	41.0	0.00	0.00	7	0.0	0
6/22	0	0	100	60.000	36	36.5	0.00	0.00	5	0.0	0
6/23	50	1	200	55.000	1	.6	2.86	546.00	0	0.0	4
6/23	51	3	200	53.000	1	.6	2.72	567.00	0	0.0	4
6/23	52	5	200	55.000	0	0.0	0.00	0.00	0	0.0	4
6/23	53	7	200	58.500	18	9.2	2.84	560.00	0	0.0	3
6/23	54	9	200	67.500	49	21.8	3.18	573.00	4	3.3	4
6/23	55	11	200	41.000	0	0.0	0.00	0.00	4	2.9	4
6/24	56	10	200	58.000	11	5.7	3.47	576.00	3	1.5	4
6/24	57	8	200	61.500	25	12.2	2.82	567.00	0	0.0	4
6/24	58	6	200	55.500	16	8.7	3.11	547.00	2	1.1	4
6/24	59	4	200	58.500	1	.5	3.25	590.00	0	0.0	1
6/24	60	2	200	54.500	11	6.1	2.40	555.00	0	0.0	3
6/25	61	1	200	56.000	0	0.0	0.00	0.00	1	.5	3
6/25	62	3	200	57.500	20	10.4	2.94	566.00	4	2.1	4
6/25	63	5	200	51.500	1	.6	2.68	574.00	0	0.0	4
6/25	64	7	200	55.000	23	12.5	3.10	574.00	0	0.0	4
6/25	65	9	200	55.500	36	19.5	2.99	562.00	3	1.6	3
6/25	66	11	200	42.000	6	4.3	3.00	555.00	11	7.9	3
6/26	67	2	200	57.500	9	4.7	3.22	576.00	1	.5	3
6/26	0	0	100	60.000	35	35.3	0.00	0.00	5	0.0	0
6/27	68	1	200	53.500	1	.6	2.28	530.00	0	0.0	3
6/27	69	3	200	51.100	0	0.0	0.00	0.00	0	0.0	3
6/27	0	0	100	60.000	35	35.0	0.00	0.00	5	0.0	3
6/28	0	0	100	60.000	20	20.0	0.00	0.00	4	4.0	0
6/29	70	1	200	55.000	1	.5	3.30	587.00	2	1.1	3
6/29	71	3	200	53.500	1	.6	2.70	542.00	1	.6	4
6/29	72	5	200	53.500	1	.6	2.78	565.00	0	0.0	4
6/29	73	7	200	55.500	0	0.0	0.00	0.00	0	0.0	2
6/29	74	9	200	54.000	8	4.4	3.31	577.00	4	2.2	3
6/29	75	11	200	42.500	0	0.0	0.00	0.00	0	0.0	3
6/30	76	10	200	57.500	3	1.6	3.38	576.00	2	1.0	3
6/30	77	8	200	65.000	50	23.1	3.01	566.00	6	2.8	3
6/30	78	6	200	52.000	2	1.1	3.63	597.00	0	0.0	3
6/30	79	4	200	53.500	1	.6	2.50	542.00	0	0.0	3
6/30	80	2	200	53.500	7	3.9	2.88	558.00	0	0.0	4
7/01	81	1	200	56.500	1	.5	3.05	575.00	0	0.0	4
7/01	82	3	200	52.500	0	0.0	0.00	0.00	0	0.0	4
7/01	83	5	200	57.000	3	1.6	2.95	580.00	3	1.6	3
7/01	84	7	200	56.000	3	1.6	2.94	573.00	0	0.0	3
7/01	85	9	200	60.500	42	20.8	2.90	564.00	1	.5	4
7/01	86	11	200	47.000	1	.6	3.35	608.00	7	4.5	3
7/02	0	0	100	60.000	49	49.4	0.00	0.00	16	0.0	0

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Appendix table 3A. (Continued)

Date	Set No.	Station	Gear Length (Fathoms)	Mean Fishing Time (Min)	Sockeye Catch	Test Fishing Index (Daily)	Mean Weight	Mean Length	Chum Catch	Test Fishing Index (Daily)	Tide
7/03	87	1	200	54.500	0	0.0	0.00	0.00	1	.6	1
7/03	88	3	200	57.500	9	4.7	2.77	556.00	0	0.0	3
7/03	89	5	200	58.500	15	7.7	3.06	574.00	3	1.5	3
7/03	90	7	200	72.000	92	38.4	2.98	565.00	6	2.5	2
7/03	91	9	200	58.000	40	20.7	3.13	559.00	11	5.7	4
7/03	92	11	200	55.000	4	2.2	2.34	526.00	2	1.1	4
7/04	93	10	200	54.000	16	8.9	3.16	575.00	1	.6	4
7/04	94	8	200	49.000	4	2.5	2.94	577.00	3	1.8	1
7/04	95	6	200	51.000	1	.6	2.64	542.00	1	.6	3
7/04	96	4	200	55.500	2	1.1	2.63	524.00	1	.5	3
7/04	97	2	200	54.500	3	1.6	3.75	596.00	2	1.1	1
7/05	98	1	200	57.000	0	0.0	0.00	0.00	0	0.0	4
7/05	99	3	200	53.500	0	0.0	0.00	0.00	1	.6	4
7/05	100	5	200	52.500	0	0.0	0.00	0.00	0	0.0	1
7/05	101	7	200	59.000	14	7.9	3.36	585.00	3	1.7	3
7/05	102	9	200	55.500	6	3.2	3.46	597.00	4	2.2	3
7/05	103	11	200	58.500	6	3.1	3.36	583.00	13	6.7	2
7/06	104	10	200	63.500	5	2.4	3.30	578.00	7	3.3	4
7/06	105	8	200	58.000	20	10.3	3.28	574.00	4	2.1	3
7/06	106	6	200	57.000	12	6.3	2.90	557.00	0	0.0	3
7/06	107	4	200	55.000	1	.5	2.36	530.00	1	.6	3
7/07	108	1	200	51.000	0	0.0	0.00	0.00	0	0.0	4
7/07	109	3	200	50.500	0	0.0	0.00	0.00	0	0.0	4
7/07	110	5	200	57.500	23	12.0	2.36	548.00	3	1.6	4
7/07	111	7	200	52.000	4	2.3	2.82	570.00	1	.6	3
7/07	112	9	200	54.000	14	7.8	2.75	554.00	0	0.0	4
7/07	113	11	200	52.500	5	2.9	3.10	566.00	3	1.7	4
7/08	114	10	200	53.500	2	1.1	3.65	601.00	2	1.1	3
7/08	115	8	200	56.000	3	1.6	2.44	535.00	4	2.1	4
7/08	116	6	200	58.500	19	9.7	2.96	563.00	5	2.6	1
7/08	117	4	200	51.000	2	1.2	2.26	509.00	1	.6	3
7/08	118	2	200	52.500	4	2.3	3.82	607.00	4	2.3	3

Appendix Table 4A. Surface water temperatures (C) encountered during the 1982 Port Moller offshore test fishing project by station.

Date	1	2	3	4	5	6	7	8	9	10	11	Average
6/11	4.0		4.5		4.0		3.0		6.0		4.5	4.33
6/12		-		5.0		4.0		4.5		4.0		4.38
6/13	5.5		6.0		5.0		7.0		7.0		7.0	6.25
6/14		5.5		5.5		5.0		5.5		5.5		5.40
6/15	6.0		6.0		5.5		6.5		6.0		6.0	6.00
6/16		7.0		6.0		5.5		6.0		6.5		6.20
6/17	8.0		7.0		7.0		7.0		-		-	7.25
6/18		7.0		6.0		5.5		6.0		7.0		6.30
6/19	4.5		7.0		7.0		7.0		9.0		8.0	7.08
6/20		7.0		7.0		-		-		-		7.00
6/21	-		-		-		-		-		-	-
6/22		-		-		-		-		-		-
6/23	6.5		6.5		6.0		5.0		6.0		5.0	5.83
6/24		6.5		6.0		4.0		6.0		5.0		5.50
6/25	6.0		6.0		7.0		7.0		8.0		6.0	6.67
6/26		7.5		-		-		-		-		-
6/27	7.0		7.0		-		-		-		-	-
6/28		-		-		-		-		-		-
6/29	5.5		5.5		6.0		6.0		6.0		4.0	5.50
6/30		5.0		7.0		7.0		6.0		5.5		6.10
7/01	5.0		8.0		7.0		7.0		6.0		5.0	6.33
7/02		-		-		-		-		-		-
7/03	4.0		5.0		6.0		6.0		7.0		4.5	5.42
7/04		6.0		6.0		6.0		5.5		4.5		5.60
7/05	5.0		5.0		6.0		6.0		5.0		4.0	5.17
7/06		-		5.0		5.5		5.0		5.0		5.13
7/07	5.0		4.5		6.0		6.0		6.0		6.0	5.58
7/08		-		-		-		-		-		-
Average	5.54	6.44	6.00	5.94	6.04	5.31	6.19	5.56	6.55	5.22	5.45	5.86

**APPENDIX B**

Appendix Table 1B. 1968 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/10	4	1.54	552.75	50.00	.77	520.00	50.00	.77	585.50
6/11	0	1.68	-	56.22	.94	-	43.56	.73	-
6/12	0	1.83	-	56.22	1.03	-	43.56	.80	-
6/13	0	1.97	-	56.22	1.11	-	43.56	.86	-
6/14	5	2.11	609.25	25.00	.53	578.00	75.00	1.58	619.67
6/15	47	19.29	553.34	30.95	5.97	511.08	69.05	13.32	572.28
6/16	10	4.09	539.84	42.86	1.75	516.67	42.86	1.75	563.00
6/17	36	15.19	552.94	54.84	8.33	529.71	45.16	6.86	581.14
6/18	8	3.35	542.71	71.43	2.39	530.80	28.57	.96	572.50
6/19	13	5.51	550.18	41.67	2.30	527.40	50.00	2.76	569.17
6/20	0	12.29	-	56.22	6.91	-	43.56	5.35	-
6/21	44	19.08	543.11	62.86	11.99	523.05	40.00	7.63	574.64
6/22	20	8.69	545.61	66.67	5.79	535.67	33.33	2.90	565.50
6/23	0	11.20	-	56.22	6.30	-	43.56	4.88	-
6/24	0	13.72	-	56.22	7.71	-	43.56	5.98	-
6/25	38	16.23	547.28	58.62	9.51	525.12	41.38	6.72	578.67
6/26	2	.82	541.00	0.00	0.00	-	100.00	.82	541.00
6/27	33	13.52	554.44	36.00	4.87	531.44	64.00	8.65	567.37
6/28	54	23.15	549.09	52.08	12.06	509.88	47.92	11.09	591.70
6/29	0	25.89	-	56.22	14.56	-	43.56	11.28	-
6/30	66	28.63	533.75	81.25	23.26	522.51	18.75	5.37	582.44
7/31	68	27.77	542.22	59.32	16.47	519.49	40.68	11.30	575.37
7/02	19	7.94	542.93	66.67	5.29	521.60	33.33	2.65	585.60
7/03	37	15.62	555.39	50.00	7.81	529.06	50.00	7.81	581.71
7/04	0	9.78	-	56.22	5.50	-	43.56	4.26	-
7/05	5	3.94	589.62	0.00	0.00	-	100.00	3.94	589.62
7/06	7	6.06	538.06	75.00	4.55	521.38	25.00	1.51	588.11
7/07	2	1.73	-	56.22	.97	-	43.56	.75	-
7/08	4	3.33	518.24	100.00	3.33	518.24	0.00	0.00	-
Totals	522	305.95		56.22	172.01		43.56	133.01	
Mean length			545.5			521.2			578.5

Appendix Table 2B. 1969 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/12	2	.85	-	78.71	.67	-	20.83	.18	-
6/13	27	11.56	552.54	63.64	7.36	529.85	36.36	4.20	592.25
6/14	4	1.65	563.50	50.00	.82	539.00	50.00	.82	588.00
6/15	0	1.26	-	78.71	.99	-	20.83	.26	-
6/16	2	.84	-	78.71	.66	-	20.83	.17	-
6/17	0	1.26	-	78.71	.99	-	20.83	.26	-
6/18	0	1.26	-	78.71	.99	-	20.83	.26	-
6/19	2	1.29	-	78.71	1.02	-	20.83	.27	-
6/20	102	43.61	533.03	81.40	35.50	524.29	18.60	8.11	571.25
6/21	72	26.40	534.59	76.92	20.31	521.24	23.08	6.09	579.07
6/22	41	16.84	521.03	82.76	13.94	514.37	17.24	2.90	553.00
6/23	118	49.08	534.62	79.31	38.93	522.16	20.69	10.15	582.39
6/24	109	44.91	530.91	83.15	37.34	523.27	16.85	7.57	568.60
6/25	79	32.46	535.02	80.00	25.97	525.72	18.00	5.84	576.33
6/26	101	41.75	535.97	74.44	31.08	522.82	24.44	10.21	576.00
6/27	49	21.35	536.30	80.56	17.20	530.48	19.44	4.15	560.43
6/28	111	47.85	540.90	81.63	39.06	532.87	18.37	8.79	576.61
6/29	0	53.39	-	78.71	42.02	-	20.83	11.12	-
6/30	142	58.92	543.63	75.68	44.59	527.61	24.32	14.33	593.48
7/01	92	38.04	539.88	76.47	29.09	525.27	23.53	8.95	587.37
7/02	64	27.54	543.51	84.78	23.35	538.36	13.04	3.59	577.00
7/03	51	22.08	549.61	76.74	16.95	538.67	23.26	5.13	585.70
7/04	36	21.52	539.07	75.86	16.33	529.95	20.69	4.45	572.50
7/05	41	18.18	545.56	74.07	13.47	530.15	25.93	4.71	589.57
7/06	5	4.56	507.00	100.00	4.56	507.00	0.00	0.00	-
7/07	17	14.88	-	78.71	11.71	-	20.83	3.10	-
7/08	9	8.10	-	78.71	6.38	-	20.83	1.69	-
7/09	11	9.54	-	78.71	7.51	-	20.83	1.99	-
Totals	1,287	620.97		78.7	488.76		20.8	129.32	
Mean Length			537.8			526.5			580.4

Appendix Table 3B. 1970 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/11	2	1.20	542.00	100.00	1.20	542.00	0.00	0.00	-
6/12	6	2.80	564.33	0.00	0.00	-	100.00	2.80	564.33
6/13	0	0.00	-	81.32	0.00	-	18.84	0.00	-
6/14	0	8.78	-	81.32	7.14	-	18.84	1.65	-
6/15	0	8.78	-	81.32	7.14	-	18.84	1.65	-
6/16	0	8.78	-	81.32	7.14	-	18.84	1.65	-
6/17	0	8.78	-	81.32	7.14	-	18.84	1.65	-
6/18	0	8.78	-	81.32	7.14	-	18.84	1.65	-
6/19	0	8.78	-	81.32	7.14	-	18.84	1.65	-
6/20	34	21.10	540.81	48.39	10.21	520.07	51.61	10.89	560.25
6/21	90	49.30	532.57	70.89	34.95	519.00	29.11	14.35	565.60
6/22	70	44.90	529.42	66.13	29.69	511.40	33.87	15.21	564.60
6/23	27	24.80	536.96	73.91	18.33	527.10	30.43	7.55	560.90
6/24	22	39.10	523.70	100.00	39.10	523.70	0.00	0.00	-
6/25	64	47.30	527.67	73.58	34.81	517.00	26.42	12.49	557.40
6/26	104	72.10	523.11	91.43	65.92	520.10	8.57	6.18	555.20
6/27	126	73.40	522.30	86.67	63.61	516.90	13.33	9.79	557.42
6/28	85	49.20	529.84	73.24	36.03	519.80	26.76	13.17	557.30
6/29	110	59.70	525.44	85.54	51.07	523.30	14.46	8.63	538.10
6/30	125	89.60	521.48	85.29	76.42	516.70	14.71	13.18	549.20
7/01	0	58.00	-	81.32	47.16	-	18.84	10.93	-
7/02	45	26.30	530.92	79.49	20.91	524.70	20.51	5.39	555.00
7/03	12	7.60	519.82	90.00	6.84	514.80	10.00	.76	565.00
7/04	31	19.20	523.55	92.31	17.72	520.80	7.69	1.48	556.50
7/05	19	11.30	527.82	88.24	9.97	523.00	11.76	1.33	564.00
7/06	59	36.30	536.07	88.89	32.27	533.70	11.11	4.03	555.00
7/07	0	18.20	-	81.32	14.80	-	18.84	3.43	-
7/08	0	18.20	-	81.32	14.80	-	18.84	3.43	-
7/09	0	0.00	-	81.32	0.00	-	18.84	0.00	-
7/10	0	0.00	-	81.32	0.00	-	18.84	0.00	-
7/11	2	1.10	-	81.32	.89	-	18.84	.21	-
Totals	1,033	823.38		81.32	699.54		18.84	155.15	
Mean length			526.11			519.33			556.30

Appendix Table 4B. 1971 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/17	3	5.70	522.00	100.00	5.70	522.00	0.00	0.00	-
6/18	0	7.30	-	33.44	2.44	-	66.22	4.83	-
6/19	0	8.80	-	33.44	2.94	-	66.22	5.83	-
6/20	0	10.40	-	33.44	3.48	-	66.22	6.89	-
6/21	8	20.70	565.75	12.50	2.59	534.00	87.50	18.11	570.29
6/22	27	44.80	543.05	45.45	20.36	519.80	50.00	22.40	564.18
6/23	6	11.60	570.20	20.00	2.32	503.00	80.00	9.28	587.00
6/24	24	25.50	557.17	16.67	4.25	531.00	83.33	21.25	562.40
6/25	2	5.30	549.00	0.00	0.00	-	100.00	5.30	549.00
6/26	19	82.10	556.73	20.00	16.42	528.67	80.00	65.68	563.75
6/27	11	8.40	561.22	22.22	1.87	516.50	77.78	6.53	574.00
6/28	0	10.60	-	33.44	3.54	-	66.22	7.02	-
6/29	0	12.80	-	33.44	4.28	-	66.22	8.48	-
6/30	0	12.80	-	33.44	4.28	-	66.22	8.48	-
7/01	0	12.80	-	33.44	4.28	-	66.22	8.48	-
7/02	0	12.80	-	33.44	4.28	-	66.22	8.48	-
7/03	22	16.50	554.34	27.78	4.58	510.20	72.22	11.92	571.31
7/04	26	26.30	557.77	31.82	8.37	527.71	68.18	17.93	571.80
7/05	114	70.10	554.55	24.49	17.17	517.87	75.51	52.93	566.45
7/06	89	70.40	545.55	40.79	28.72	517.84	59.21	41.68	564.64
7/07	170	111.60	546.50	42.31	47.22	520.67	57.69	64.38	565.44
7/08	90	60.00	551.59	44.00	26.40	522.45	56.00	33.60	574.48
7/09	15	10.90	542.50	50.00	5.45	533.17	50.00	5.45	551.83
7/10	30	22.30	550.85	29.63	6.61	532.37	70.37	15.69	558.63
Totals	656	680.50		33.44	227.54		66.22	450.62	
Mean length			549.37			520.53			566.54

Appendix Table 5B. 1972 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/21	12	2.57	567.29	45.45	1.17	544.00	54.55	1.40	586.70
6/22	11	7.34	574.49	37.50	2.75	528.30	62.50	4.59	602.20
6/23	0	4.75	-	38.82	1.84	-	65.54	3.11	-
6/24	0	4.75	-	38.82	1.84	-	65.54	3.11	-
6/25	0	7.75	-	38.82	3.01	-	65.54	5.08	-
6/26	4	2.15	609.00	0.00	0.00	-	100.00	2.15	609.00
6/27	0	1.82	-	38.82	.71	-	65.54	1.19	-
6/28	3	1.50	549.00	100.00	1.50	549.00	0.00	0.00	-
6/29	5	2.50	575.00	0.00	0.00	-	100.00	2.50	575.00
6/30	14	9.88	547.75	41.67	4.12	533.40	58.33	5.76	558.00
7/01	3	1.55	541.29	100.00	1.55	502.30	233.33	3.62	558.00
7/02	0	4.09	-	38.82	1.59	-	65.54	2.68	-
7/03	13	6.62	565.26	30.77	2.04	537.50	69.23	4.58	577.60
7/04	3	1.55	575.00	0.00	0.00	-	100.00	1.55	575.00
7/05	14	7.48	547.07	66.67	4.99	526.10	33.33	2.49	589.00
7/06	14	7.74	547.25	41.67	3.22	523.80	41.67	3.22	570.70
7/07	1	5.65	-	38.82	2.19	-	65.54	3.70	-
7/08	32	15.99	550.69	29.63	4.74	517.90	70.37	11.25	564.50
7/09	2	2.04	583.53	33.33	.68	520.00	100.00	2.04	604.70
Totals	131	97.72		38.82	37.94		65.54	64.05	
Mean length			553.70			527.27			570.39

Appendix Table 6B. 1973 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/14	12	8.60	580.40	20.00	1.72	565.00	80.00	6.88	584.25
6/15	0	8.80	-	20.06	1.77	-	79.94	7.03	-
6/16	0	8.90	-	20.06	1.79	-	79.94	7.11	-
6/17	0	9.10	-	20.06	1.83	-	79.94	7.27	-
6/18	0	9.50	-	20.06	1.91	-	79.94	7.59	-
6/19	20	10.30	584.61	30.77	3.17	513.75	69.23	7.13	616.11
6/20	0	9.30	-	20.06	1.87	-	79.94	7.43	-
6/21	0	8.80	-	20.06	1.77	-	79.94	7.03	-
6/22	16	8.30	591.36	9.09	.75	500.00	90.91	7.55	600.50
6/23	36	19.60	596.43	3.57	.70	520.00	96.43	18.90	599.26
6/24	0	19.70	-	20.06	3.95	-	79.94	15.75	-
6/25	33	19.70	588.20	24.00	4.73	530.00	76.00	14.97	606.58
6/26	37	18.10	594.11	21.43	3.88	559.17	78.57	14.22	603.64
6/27	96	46.20	580.31	24.05	11.11	532.89	75.95	35.09	595.33
6/28	84	42.50	580.00	22.67	9.63	537.06	77.33	32.87	592.59
6/29	0	23.00	-	20.06	4.61	-	79.94	18.39	-
6/30	6	3.50	600.00	0.00	0.00	-	100.00	3.50	600.00
7/01	22	11.60	579.41	41.18	4.78	546.43	58.82	6.82	602.50
7/02	0	12.20	-	20.06	2.45	-	79.94	9.75	-
7/03	18	12.80	577.25	20.00	2.56	551.25	80.00	10.24	583.75
7/04	20	14.00	591.36	9.09	1.27	540.00	90.91	12.73	596.50
7/05	21	15.10	592.81	12.50	1.89	555.00	87.50	13.21	598.21
Totals	421	339.60		20.06	68.11		79.94	271.49	
Mean length			582.87			536.51			595.83

Appendix Table 7B. 1975 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/13	2	1.00	602.50	0.00	0.00	-	100.00	1.00	602.50
6/14	7	2.90	547.75	100.00	2.90	547.75	0.00	0.00	-
6/15	8	4.70	526.00	100.00	4.70	526.00	0.00	0.00	-
6/16	5	4.70	481.00	100.00	4.70	481.00	0.00	0.00	-
6/17	44	22.20	550.72	71.79	15.94	537.75	28.21	6.26	583.73
6/18	79	37.80	562.96	63.27	23.91	544.87	36.73	13.89	594.11
6/19	15	10.10	529.77	69.23	6.99	519.22	30.77	3.11	553.50
6/20	20	10.30	541.24	88.24	9.09	526.60	11.76	1.21	651.00
6/21	0	19.40	-	71.31	13.83	-	28.69	5.57	-
6/22	21	27.90	540.65	78.57	21.92	524.55	21.43	5.98	599.67
6/23	0	40.00	-	71.31	28.53	-	28.69	11.47	-
6/24	0	52.10	-	71.31	37.15	-	28.69	14.95	-
6/25	100	64.30	545.20	80.56	51.80	536.83	19.44	12.50	579.86
6/26	124	60.10	548.93	69.81	41.96	534.14	30.19	18.14	583.12
6/27	626	274.40	555.66	58.66	160.96	535.44	41.34	113.44	584.36
6/28	0	60.00	-	71.31	42.79	-	28.69	17.21	-
6/29	0	60.00	-	71.31	42.79	-	28.69	17.21	-
6/30	0	60.00	-	71.31	42.79	-	28.69	17.21	-
7/01	122	60.10	552.53	67.14	40.35	532.87	32.86	19.75	592.70
7/02	131	60.00	549.30	69.30	41.58	533.06	30.70	18.42	585.94
7/03	189	110.00	538.41	84.21	92.63	530.00	15.79	17.37	583.28
7/04	121	57.30	473.40	87.91	50.37	534.03	12.09	6.93	32.49
7/05	185	96.40	548.87	73.02	70.39	531.37	26.98	26.01	596.24
7/06	37	32.10	547.06	75.00	24.07	530.46	25.00	8.02	596.87
7/07	21	13.20	551.33	77.78	10.27	541.00	22.22	2.93	587.50
7/08	111	48.30	546.63	76.67	37.03	534.50	23.33	11.27	586.50
Totals	1,968	1,289.30		71.31	919.44		28.69	369.86	
Mean length			547.13			533.92			574.64

Appendix Table 8B. 1976 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/12	0	0.00	-	55.61	0.00	-	44.37	0.00	-
6/13	4	1.90	557.00	100.00	1.90	557.00	-	0.00	-
6/14	6	2.80	542.20	60.00	1.68	506.00	40.00	1.12	596.50
6/15	6	3.00	545.00	50.00	1.50	509.50	50.00	1.50	580.50
6/16	0	1.50	-	55.61	.83	-	44.37	.67	-
6/17	0	0.00	-	55.61	0.00	-	44.37	0.00	-
6/18	3	1.50	533.33	33.33	.50	432.00	66.67	1.00	584.00
6/19	31	16.40	557.34	61.54	10.09	535.80	38.46	6.31	591.80
6/20	8	3.90	504.30	100.00	3.90	504.30	-	0.00	-
6/21	49	26.70	542.99	68.18	18.20	525.20	31.82	8.50	581.10
6/22	21	10.00	564.31	57.89	5.79	533.70	42.11	4.21	606.40
6/23	36	20.80	535.17	74.19	15.43	517.80	25.81	5.37	585.10
6/24	50	23.20	541.97	73.33	17.01	531.20	26.67	6.19	571.60
6/25	29	18.90	541.83	66.67	12.60	529.80	33.33	6.30	565.90
6/26	75	33.20	546.92	68.85	22.86	529.20	31.15	10.34	586.10
6/27	28	19.20	549.69	56.00	10.75	527.60	44.00	8.45	577.80
6/28	67	32.10	545.34	67.74	21.75	531.40	32.26	10.35	574.60
6/29	223	108.70	557.17	46.59	50.64	534.10	53.41	58.06	577.30
6/30	131	57.30	548.06	63.33	36.29	530.30	35.56	20.37	579.70
7/01	56	29.70	561.03	47.06	13.98	532.60	52.94	15.72	586.30
7/02	38	18.70	570.14	36.00	6.73	538.40	64.00	11.97	588.00
7/03	38	23.10	560.20	39.39	9.10	535.90	60.61	14.00	576.00
7/04	101	49.00	551.68	59.57	29.19	532.60	42.55	20.85	578.40
7/05	124	70.10	561.73	39.78	27.89	536.50	60.22	42.21	578.40
7/06	122	58.20	553.26	49.06	28.55	530.60	50.00	29.10	575.50
7/07	42	26.30	544.43	61.11	16.07	526.50	38.89	10.23	572.60
7/08	65	32.40	544.64	60.66	19.65	526.70	39.34	12.75	572.30
Totals	1,353	688.60		55.61	382.90		44.37	305.56	
Mean length			552.95			531.46			578.03

Appendix Table 9B. 1977 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/12	10	5.20	593.29	28.57	1.49	564.50	71.43	3.71	604.80
6/13	24	11.70	575.82	41.18	4.82	520.71	58.82	6.88	614.40
6/14	3	2.90	625.00	0.00	0.00	-	100.00	2.90	625.00
6/15	0	6.50	-	45.23	2.94	-	54.77	3.56	-
6/16	20	10.10	557.42	33.33	3.37	504.25	66.67	6.73	584.00
6/17	52	25.30	579.76	40.48	10.24	576.29	59.52	15.06	582.12
6/18	38	19.90	577.52	27.27	5.43	539.00	72.73	14.47	591.96
6/19	85	42.10	567.45	46.15	19.43	535.61	53.85	22.67	594.74
6/20	116	56.70	559.72	50.75	28.77	523.24	49.25	27.93	597.30
6/21	53	26.50	582.65	44.19	11.71	548.79	55.81	14.79	609.46
6/22	124	63.70	565.27	47.17	30.05	530.44	52.83	33.65	596.37
6/23	120	54.90	563.85	48.04	26.37	531.51	51.96	28.53	593.75
6/24	117	61.70	564.13	48.54	29.95	527.70	51.46	31.75	598.49
6/25	104	49.80	571.58	45.83	22.83	544.34	54.17	26.98	594.63
6/26	142	75.30	569.10	40.00	30.12	538.58	60.00	45.18	589.44
6/27	14	11.80	597.08	8.33	.98	494.00	91.67	10.82	606.45
6/28	0	40.20	-	45.23	18.18	-	54.77	22.02	-
6/29	82	68.20	548.19	56.52	38.55	523.97	43.48	29.65	579.67
6/30	0	48.10	-	45.23	21.76	-	54.77	26.34	-
7/01	4	27.70	559.00	50.00	13.85	551.00	50.00	13.85	567.00
7/02	0	24.50	-	45.23	11.08	-	54.77	13.42	-
7/03	41	21.20	564.11	48.57	10.30	541.82	51.43	10.90	585.17
7/04	55	28.10	574.37	41.18	11.57	545.19	58.82	16.53	594.80
Totals	1,204	782.10		45.23	353.78		54.77	428.32	
Mean length			565.67			533.66			593.16

Appendix Table 10B. 1978 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/11	13	5.89	583.73	18.18	1.07	530.67	72.73	4.28	597.00
6/12	3	1.49	621.00	0.00	0.00	-	100.00	1.49	621.00
6/13	14	6.55	550.18	41.67	2.73	511.40	50.00	3.28	582.50
6/14	0	2.44	-	57.19	1.40	-	41.33	1.01	-
6/15	13	6.66	544.82	63.64	4.24	517.86	36.36	2.42	592.00
6/16	2	4.65	588.00	100.00	4.65	588.00	0.00	0.00	-
6/17	0	4.73	-	57.19	2.71	-	41.33	1.96	-
6/18	10	4.85	560.00	55.56	2.69	534.00	44.44	2.16	592.50
6/19	17	8.31	552.07	66.67	5.54	528.00	33.33	2.77	600.20
6/20	60	26.41	561.97	42.11	11.12	532.17	57.89	15.29	583.64
6/21	0	30.45	-	57.19	17.41	-	41.33	12.59	-
6/22	0	34.40	-	57.19	19.67	-	41.33	14.22	-
6/23	0	38.52	-	57.19	22.03	-	41.33	15.92	-
6/24	72	42.55	537.16	60.94	25.93	512.46	39.06	16.62	575.68
6/25	39	22.04	548.00	60.00	13.22	520.71	40.00	8.82	588.93
6/26	13	22.74	542.10	54.55	12.40	527.67	36.36	8.27	563.75
6/27	0	23.45	-	57.19	13.41	-	41.33	9.69	-
6/28	0	24.15	-	57.19	13.81	-	41.33	9.98	-
6/29	52	24.86	518.84	68.63	17.06	519.14	31.37	7.80	518.19
6/30	34	14.98	534.46	61.54	9.22	515.75	38.46	5.76	564.40
7/01	56	25.45	539.37	64.00	16.29	518.56	34.00	8.65	578.53
7/02	16	16.04	562.57	21.43	3.44	519.00	78.57	12.60	574.45
7/03	47	22.65	543.09	61.90	14.02	525.27	38.10	8.63	572.06
7/04	24	11.83	537.17	72.22	8.54	522.31	27.78	3.29	575.80
7/05	17	9.07	528.54	61.54	5.58	502.12	38.46	3.49	570.80
7/06	23	11.38	531.05	63.16	7.19	513.83	31.58	3.59	565.50
Totals	525	446.54		57.19	255.38		41.33	184.57	
Mean lengths			541.25			519.33			572.66

Appendix Table 11B. 1979 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/06	2	1.03	555.00	50.00	.51	520.00	50.00	.51	590.00
6/07	2	.96	555.00	50.00	.48	540.00	50.00	.48	570.00
6/08	0	1.39	-	78.31	1.09	-	21.55	.30	-
6/09	4	1.80	501.25	50.00	.90	462.50	50.00	.90	540.00
6/10	1	2.01	-	78.31	1.57	-	21.55	.43	-
6/11	5	2.22	555.00	50.00	1.11	555.00	0.00	0.00	572.00
6/12	60	30.98	551.46	67.27	20.84	535.10	32.73	10.14	585.10
6/13	48	24.10	542.52	77.50	18.68	533.90	22.50	5.42	572.20
6/14	90	42.73	550.56	68.00	29.06	533.60	32.00	13.67	586.60
6/15	45	19.22	560.95	58.54	11.25	539.80	41.46	7.97	590.80
6/16	130	85.41	549.70	75.68	64.63	539.80	24.32	20.78	580.50
6/17	0	85.40	-	78.31	66.88	-	21.55	18.41	-
6/18	20	85.40	533.59	93.75	80.06	528.50	6.25	5.34	610.00
6/19	66	37.38	551.10	69.57	26.00	532.50	30.43	11.38	593.60
6/20	86	56.66	546.98	77.61	43.97	536.30	22.39	12.69	584.00
6/21	152	65.18	550.72	75.78	49.39	540.60	24.22	15.79	582.40
6/22	311	124.90	543.40	81.66	101.99	533.70	18.34	22.91	586.60
6/23	120	85.14	548.04	85.00	72.37	541.20	15.00	12.77	586.80
6/24	0	74.00	-	78.31	57.95	-	21.55	15.95	-
6/25	97	58.34	541.71	83.10	48.48	536.30	16.90	9.86	568.30
6/26	0	46.33	-	78.31	36.28	-	21.55	9.99	-
6/27	59	34.31	543.47	83.78	28.75	534.60	16.22	5.56	589.30
6/28	95	52.58	548.82	64.06	33.68	531.10	35.94	18.90	580.40
6/29	29	16.98	537.88	83.33	14.15	535.20	16.67	2.83	551.30
Totals	1,422	1,034.45		78.31	810.09		21.55	222.97	
Mean length			546.53			536.14			583.85

Appendix Table 12B. 1980 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/07	6	2.85	575.27	20.00	.57	531.00	80.00	2.28	586.34
6/08	1	.98	547.00	0.00	0.00	-	100.00	.98	547.00
6/09	0	2.45	-	56.67	1.39	-	43.05	1.05	-
6/10	1	.64	-	56.67	.36	-	43.05	.28	-
6/11	0	5.62	-	56.67	3.18	-	43.05	2.42	-
6/12	17	7.92	550.07	57.14	4.53	523.25	42.86	3.39	585.83
6/13	19	8.82	555.21	35.71	3.15	522.60	64.29	5.67	573.33
6/14	7	3.44	597.40	20.00	.69	551.00	80.00	2.75	609.00
6/15	41	19.49	557.97	51.61	10.06	528.50	48.39	9.43	589.40
6/16	40	18.50	549.00	48.57	8.99	526.18	51.43	9.51	570.56
6/17	36	18.70	549.09	60.61	11.33	529.55	39.39	7.37	579.15
6/18	50	25.59	540.35	58.54	14.98	530.17	41.46	10.61	554.71
6/19	45	24.45	550.64	46.15	11.28	527.83	53.85	13.17	570.19
6/20	0	21.17	-	56.67	12.00	-	43.05	9.11	-
6/21	28	24.08	527.96	73.91	17.80	512.12	26.09	6.28	572.83
6/22	0	15.95	-	56.67	9.04	-	43.05	6.87	-
6/23	0	22.30	-	56.67	12.64	-	43.05	9.60	-
6/24	20	10.74	548.17	75.00	8.06	536.33	25.00	2.68	583.67
6/25	46	20.87	531.47	72.50	15.13	519.38	27.50	5.74	563.36
6/26	44	22.14	530.66	68.42	15.15	519.85	31.58	6.99	554.08
6/27	58	26.40	548.13	48.08	12.69	528.72	51.92	13.71	566.11
6/28	14	7.39	542.82	30.77	2.27	514.50	53.85	3.98	559.00
6/29	49	23.30	539.14	54.76	12.76	519.78	45.24	10.54	562.58
6/30	39	18.65	539.24	58.82	10.97	518.40	41.18	7.68	569.00
7/01	103	45.19	539.63	73.40	33.17	530.94	26.60	12.02	563.60
7/02	0	24.44	-	56.67	13.85	-	43.05	10.52	-
7/03	17	8.65	551.72	50.00	4.32	530.43	50.00	4.32	573.00
7/04	37	17.13	549.23	55.88	9.57	529.89	44.12	7.56	573.73
7/05	0	11.25	-	56.67	6.38	-	43.05	4.84	-
7/06	7	3.52	566.80	20.00	.70	547.00	80.00	2.82	571.75
7/07	19	9.20	563.18	50.00	4.60	535.00	50.00	4.60	591.37
7/08	6	4.84	546.20	40.00	1.94	530.00	60.00	2.90	557.00
7/09	15	15.70	557.78	55.56	8.72	539.60	44.44	6.98	580.50
7/10	0	7.64	-	56.67	4.33	-	43.05	3.29	-
7/11	0	10.02	-	56.67	5.68	-	43.05	4.31	-
7/12	10	9.71	551.12	25.00	2.43	529.50	75.00	7.28	558.33
7/13	5	4.75	537.00	66.67	3.17	520.50	33.33	1.58	570.00
7/14	1	1.15	612.00	0.00	0.00	-	100.00	1.15	612.00
7/15	1	1.15	-	56.67	.65	-	43.05	.50	-
Totals	782	526.78		56.67	298.52		43.05	226.77	
Mean length			542.71			526.96			567.69

Appendix Table 13B. 1981 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/10	6	2.73	566.83	33.33	.91	553.00	66.67	1.82	573.75
6/11	3	1.34	545.00	50.00	.67	526.00	50.00	.67	564.00
6/12	2	1.04	531.00	50.00	.52	541.00	50.00	.52	521.00
6/13	3	1.54	534.67	66.67	1.03	522.00	33.33	.51	560.00
6/14	4	1.94	-	38.31	.74	-	61.40	1.19	-
6/15	0	1.45	-	38.31	.56	-	61.40	.89	-
6/16	0	.97	-	38.31	.37	-	61.40	.60	-
6/17	0	.49	-	38.31	.19	-	61.40	.30	-
6/18	0	0.00	-	38.31	0.00	-	61.40	0.00	-
6/19	14	12.45	576.08	33.33	4.15	548.75	66.67	8.30	589.75
6/20	78	35.20	560.54	40.58	14.28	537.82	59.42	20.92	576.05
6/21	75	33.16	565.83	42.19	13.99	542.07	57.81	19.17	583.16
6/22	176	69.76	564.83	41.67	29.07	537.13	58.33	40.69	584.62
6/23	156	76.65	566.42	34.81	26.69	531.68	65.19	49.96	584.97
6/24	205	105.72	565.83	36.46	38.55	537.00	63.54	67.17	582.37
6/25	0	84.00	-	38.31	32.18	-	61.40	51.58	-
6/26	103	58.31	579.75	21.84	12.73	549.37	77.01	44.91	588.36
6/27	137	81.31	566.41	37.84	30.77	536.62	62.16	50.54	584.54
6/28	0	72.45	-	38.31	27.76	-	61.40	44.48	-
6/29	0	63.59	-	38.31	24.36	-	61.40	39.04	-
6/30	93	54.73	562.06	46.58	25.49	534.03	53.42	29.24	586.49
7/01	55	55.48	561.60	48.94	27.15	534.83	51.06	28.33	587.25
7/02	0	59.42	-	38.31	22.77	-	61.40	36.48	-
7/03	0	63.35	-	38.31	24.27	-	61.40	38.90	-
7/04	111	67.29	567.39	42.42	28.55	547.88	55.56	37.38	582.29
7/05	43	23.50	564.70	42.42	9.97	529.29	57.58	13.53	590.79
7/06	45	24.28	572.53	22.22	5.40	531.37	77.78	18.88	584.29
Totals	1,309	1,052.15		38.31	403.10		61.40	646.02	
Mean length			566.49			537.67			584.11

Appendix Table 14B. 1982 Port Moller Indices and Mean Length by Ocean Age.

Date	Total			2-Ocean			3-Ocean		
	Catch	Index	Length	Percent	Index	Length	Percent	Index	Length
6/11	27	12.11	580.09	8.70	1.05	546.50	91.30	11.06	583.29
6/12	14	7.21	564.33	11.11	.80	534.00	88.89	6.41	568.12
6/13	7	3.16	587.60	0.00	0.00	-	100.00	3.16	587.60
6/14	26	12.59	572.10	9.52	1.20	543.00	90.48	11.39	575.16
6/15	68	29.17	572.75	9.62	2.80	528.20	90.38	26.37	577.49
6/16	14	7.16	562.92	8.33	.60	530.00	91.67	6.56	565.91
6/17	40	19.41	571.77	19.44	3.77	528.00	80.56	15.64	582.34
6/18	30	14.30	582.54	8.33	1.19	552.50	91.67	13.11	585.27
6/19	106	49.79	575.75	10.00	4.98	530.44	90.00	44.81	580.78
6/20	69	45.36	563.72	35.90	16.28	519.64	64.10	29.08	588.40
6/21	0	40.96	-	17.72	7.26	-	75.63	30.98	-
6/22	0	36.53	-	17.72	6.47	-	75.63	27.63	-
6/23	69	32.12	568.02	17.09	5.49	524.60	82.91	26.63	576.97
6/24	64	33.10	567.77	13.89	4.60	527.40	83.33	27.58	574.50
6/25	86	47.31	561.08	17.07	8.08	542.29	80.49	38.08	565.06
6/26	9	40.00	565.83	16.67	6.67	510.00	83.33	33.33	577.00
6/27	36	35.56	570.50	10.00	3.56	550.00	90.00	32.00	572.78
6/28	0	20.00	-	17.72	3.54	-	75.63	15.13	-
6/29	11	6.11	-	17.72	1.08	-	75.63	4.62	-
6/30	63	30.28	565.82	16.67	5.05	519.89	83.33	25.23	575.00
7/01	50	25.18	567.45	27.50	6.92	533.73	72.50	18.26	580.24
7/02	0	49.40	-	17.72	8.75	-	75.63	37.36	-
7/03	160	73.59	563.06	23.94	17.62	525.29	76.06	55.97	574.95
7/04	26	14.66	566.00	28.57	4.19	538.17	71.43	10.47	577.13
7/05	26	13.44	591.25	5.00	.67	540.00	95.00	12.77	593.95
7/06	38	19.57	567.31	28.12	5.50	538.89	71.87	14.07	578.43
7/07	46	24.94	555.87	38.46	9.59	528.20	61.54	15.35	573.17
7/08	30	15.93	559.12	25.00	3.98	518.67	75.00	11.95	572.61
Totals	1,115	758.94		17.72	141.71		83.33	604.98	
Mean length			567.00			527.18			576.87

APPENDIX C

Appendix Table 1C. Age, weight and length statistics for sockeye sampled from the Port Moller offshore test fishery, 1982.

	AGE						Total
	4 <sub>1</sub>	4 <sub>2</sub>	5 <sub>2</sub>	5 <sub>3</sub>	6 <sub>2</sub>	6 <sub>3</sub>	
MALES							
PERCENT	.30	7.20	27.40	2.20	0.00	9.40	46.50
MEAN LENGTH	581.67	527.55	590.07	554.14	0.00	595.73	579.78
SID. ERROR	16.45	2.88	1.50	5.71	0.00	2.37	1.14
SAMPLE SIZE	3.00	67.00	255.00	21.00	0.00	88.00	434.00
MEAN WEIGHT	3.46	2.39	3.54	2.83	0.00	3.58	3.34
SID. ERROR	.33	.05	.03	.13	0.00	.06	.03
SAMPLE SIZE	3.00	57.00	215.00	18.00	0.00	80.00	373.00
FEMALES							
PERCENT	.30	7.30	34.40	1.60	.50	9.40	53.50
MEAN LENGTH	549.67	521.51	563.25	527.53	568.00	574.58	558.45
SID. ERROR	8.84	2.72	1.47	8.38	10.83	2.20	1.12
SAMPLE SIZE	3.00	68.00	321.00	15.00	5.00	88.00	500.00
MEAN WEIGHT	2.75	2.26	3.91	2.38	3.07	3.01	2.82
SID. ERROR	.25	.04	.02	.11	.09	.04	.02
SAMPLE SIZE	2.00	53.00	270.00	14.00	4.00	80.00	423.00
SEXES COMBINED							
PERCENT	.60	14.50	61.80	3.80	.50	18.80	100.00
MEAN LENGTH	565.67	524.51	575.14	542.94	568.00	585.16	568.37
SID. ERROR	9.34	1.98	1.05	4.83	10.83	1.62	.80
SAMPLE SIZE	6.00	135.00	576.00	36.00	5.00	176.00	934.00
MEAN WEIGHT	3.11	2.32	3.19	2.64	3.07	3.30	3.06
SID. ERROR	.22	.03	.02	.09	.09	.04	.02
SAMPLE SIZE	5.00	110.00	485.00	32.00	4.00	160.00	796.00

APPENDIX D

Algorithm for estimating return per index point and predicted cumulative inshore return based on variable lag time model.

If:

$f(x)$  = variable lag time function (cf. Figure 4), and

$f^{-1}(x)$  = inverse lag time function,

then  $f(x)$  in terms of initial lag time ( $l_1$ ) and final lag time ( $l_t$ ) is given by the following:

$$F(x) = \frac{(t-2) + l_t}{t-1} + \left( \frac{l_t - l_1}{t-1} \right) x$$

The step by step sequence for the algorithm is:

1. Input initial lag time ( $l_1$ ) and final lag time ( $l_t$ ).
2. Compute parameters for the lag time function ( $f(x)$ ) and the inverse lag time function ( $f^{-1}(x)$ ).
3. Loop over lag times  $l_1$  to  $l_t$ . (Note that  $l_1$  is greater than  $l_t$ .) For each discrete lag time, compute time interval specified by the lower bound  $t^*_i$  and the upper bound  $t^{**}_i$  given by:  
 $t^*_i$  = greatest integer less than or equal to  $f^{-1}(l_i + 0.5)$ , and  
 $t^{**}_i$  = greatest integer less than or equal to  $f^{-1}(l_i - 0.5)$ .
4. Loop over time and estimate return per index point using methods of constant lag time model (except that lag time varies at each time step according to step three above).
5. Loop over time and compute vector of predicted cumulative returns under the variable lag time model specified by the initial and final lagtimes input in step 1 above. Compute value of the error function.
6. Repeat for another set of initial and final lag times.

# 1982 KVICHAK, EGEGIK, AND UGASHIK ESCAPEMENT TEST FISHING

By

Brian G. Bue  
Alaska Department of Fish and Game  
Division of Commercial Fisheries  
Anchorage, Alaska

## INTRODUCTION

The escapement test fishing program which began in 1960 is designed to provide an early estimate of spawning escapement. Since the Bristol Bay sockeye salmon (*Oncorhynchus nerka*) escapement cannot be accessed at a counting tower until 3 to 15 days after passing through the commercial fishery, and because 80% of the salmon run occurs within a 2-week period, an early estimate of escapement is necessary for timely management decisions.

To be successful a test fishery must: (1) forecast the escapement accurately, and (2) provide this information as soon as possible after the fish pass through the commercial fishing district. The difficulty in estimating escapements with test fish projects is the extreme variability in tower counts per test fish index values between years. Some of the variance in tower counts per index values can be accounted for by considering the relative catchability of the fish as measured by their mean length. This relationship along with an entry pattern model which utilizes lag time (the time it takes for fish to pass from the test fishery to the counting tower) was used to forecast tower counts from the test fish indices in 1982.

## METHODS AND MATERIALS

### Test Fishing

Test fishing was conducted in the river mouths, usually immediately upstream from the commercial fishing district boundaries (Figure 1). Each tide was fished for 30 minutes or less with 25 to 50 fm (45.8 - 91.5 m) of 137 mm (5-3/8") stretch mesh gillnet. The objective was to minimize the catch while still obtaining a good estimate of fish passage rates. Fishing began at the start of the floodtide on the Kvichak River, 1-1/2 hours before high slack on the Egegik River, and 1-1/2 hours prior to low slack on the Ugashik River. The Ugashik River test fish sites were again relocated in 1982 in an attempt to minimize the effects of fish milling in the lower river.

After each tide, the standard test fish index (fish per fathom hour) was calculated for each set along with standard age, weight, and length sampling of the catch. The daily test fish index was the mean of the individual test fish indices taken during the corresponding day.

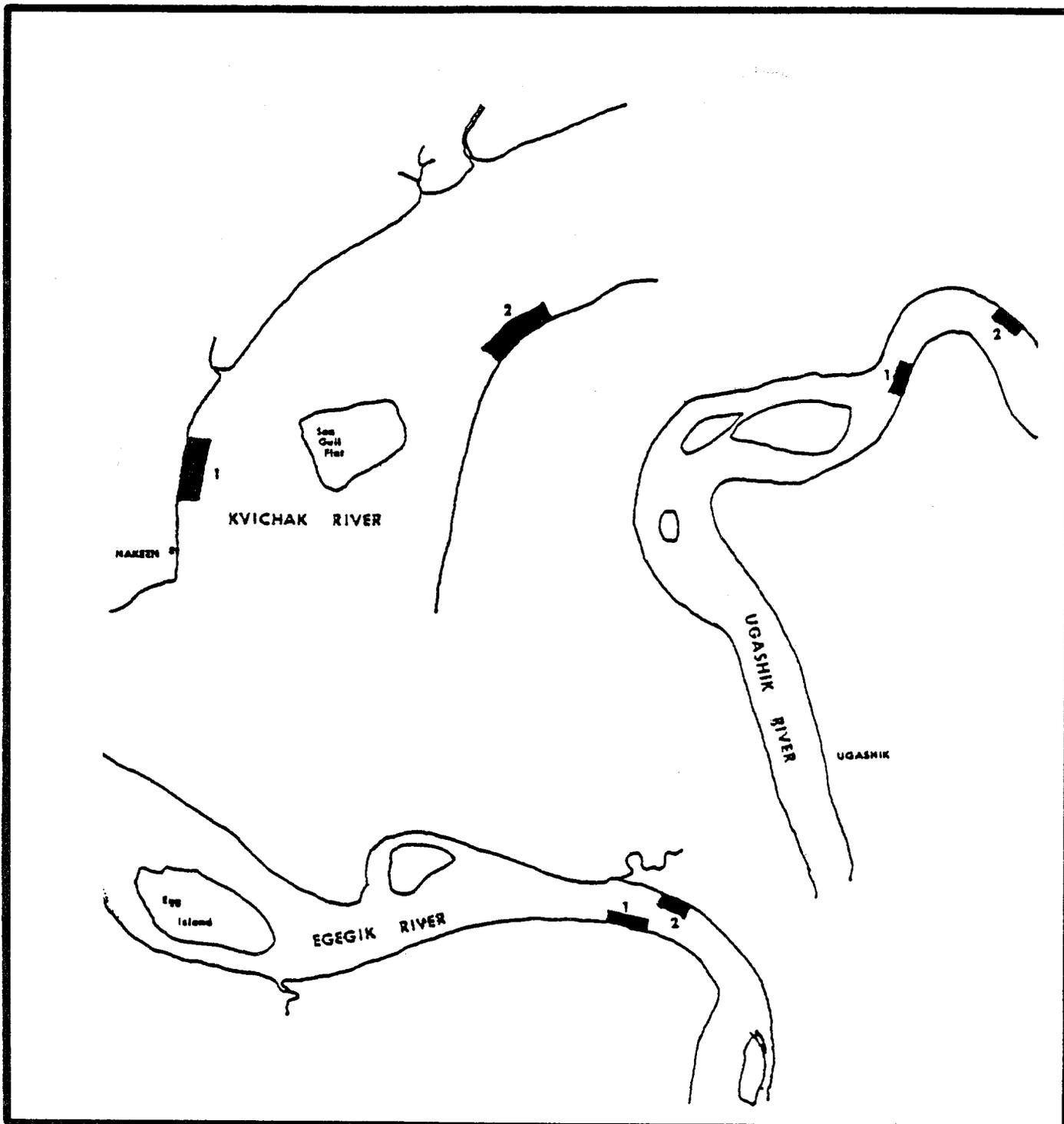


Figure 1. Locations of sockeye salmon escapement test fishing sites, Kvichak, Egegik, and Ugashik Rivers, 1982.

## Escapement Estimates

Daily escapement estimates were made from the test fisheries using: (1) lag time to compare cumulative tower counts to cumulative daily test fish indices, and (2) a catchability model based on running mean length.

Lag time was determined by matching cumulative test fish curves with cumulative escapement curves. After lag time was determined, the actual cumulative escapement was compared with the lagged cumulative test fish index to generate another estimated count per index value. This count per index value was multiplied by the cumulative daily test fish index to obtain the estimated escapement based on lag time.

The relationship between fish length and catchability was determined from historic data (Appendix Table 1) and described with a power regression curve:

$$Y = aX^b$$

Where:

Y = Expected tower count/daily test fish index point.

X = Mean length of fish (mm).

a,b = Constants

Escapement estimates based on catchability were made by first obtaining the estimated tower count per index point (Y) utilizing the running mean length of fish captured in the test fishery. The estimated tower count per index point was then multiplied by the cumulative daily test fish index to obtain the estimated escapement.

The past test fish data were reanalyzed in the following manner. Fish cumulative escapements were truncated to the last day of test fishing plus the appropriate lag time. Thus, only fish were included in the escapement that had passed the test fish site where sampling was in progress. Daily means were taken to be the simple average of the station/tide indices rather than the average weighed by fathom-hours. Sampling was designed to minimize catch while obtaining sufficient fish to estimate passage rate. Weighing by fathom-hours tends to differentially weigh stations/tides where fish are low in density as soaking times are reduced when catches are high. To correct this the daily means were recomputed for the past years and new length-catchability relations were computed.

## RESULTS AND DISCUSSION

### Kvichak River

Test fishing began 21 June and was terminated 21 July. Over the course of the season, 1,159 sockeye salmon were captured and produced 17,718.5 daily index points. The mean sockeye length was 532.31 mm with a mean weight of 2.57 kg (Table 1, Appendix Table 2). Data by set and station is presented in Appendix Table 3.

Table 1. Sockeye salmon escapement test fish summary data, Kvichak River, 1982

DATE	FISHING TIME	CATCH	INDEX	ACCUMULATIVE INDEX	MEAN WEIGHT	MEAN LENGTH	RUNNING MEAN LENGTH
6 21	42.00	9.00	38.99	38.99	2.04	543.70	543.70
6 22	70.50	2.00	2.83	41.82	2.53	531.26	542.13
6 23	89.50	2.00	2.63	44.45	1.93	515.60	539.33
6 24	89.00	0.00	0.00	44.45	0.00	0.00	539.33
6 25	84.00	1.00	1.03	45.49	1.87	515.00	538.36
6 26	104.00	0.00	0.00	45.49	0.00	0.00	538.36
6 27	65.50	4.00	6.67	52.15	2.32	527.30	536.10
6 28	44.00	6.00	52.93	105.08	2.61	534.51	535.12
6 29	33.00	52.00	821.71	926.79	3.02	527.88	528.57
6 30	19.00	1.00	12.63	939.42	2.08	523.00	528.53
7 1	66.50	4.00	15.34	954.76	1.92	533.91	528.62
7 2	41.50	45.00	367.22	1321.99	2.21	512.30	523.99
7 3	57.50	20.00	86.65	1408.63	2.34	515.68	523.47
7 4	32.00	52.00	385.03	1793.66	2.46	537.89	525.96
7 5	22.00	86.00	1045.33	2838.99	2.57	526.96	526.28
7 6	28.00	136.00	2255.96	5094.95	2.64	531.65	528.85
7 7	11.00	105.00	2313.33	7408.28	2.52	536.96	531.52
7 8	43.50	61.00	548.87	7957.15	2.43	521.75	530.82
7 9	35.00	56.00	626.33	8583.47	2.56	535.67	531.19
7 10	37.50	83.00	959.69	9543.16	2.68	539.55	532.06
7 11	48.25	14.00	57.09	9600.25	2.20	520.30	531.99
7 12	64.25	18.00	83.30	9683.55	2.72	547.11	532.10
7 13	63.00	26.00	116.42	9799.97	1.75	531.81	532.10
7 14	39.00	86.00	1385.07	11185.04	2.62	534.47	532.41
7 15	17.13	71.00	2194.17	13379.21	2.63	549.10	535.25
7 16	27.83	63.00	884.51	14263.72	2.80	493.61	532.57
7 17	20.56	106.00	3223.17	17486.89	2.38	530.54	532.19
7 18	58.00	28.00	126.83	17613.72	2.95	549.13	532.31
7 19	46.38	12.00	62.58	17676.30	2.14	524.81	532.29
7 20	52.76	10.00	42.15	17718.46	3.26	548.65	532.31
7 21	18.76	0.00	0.00	17718.46	0.00	0.00	532.31
MEAN TOTAL		1159.00	17718.46		2.57	532.31	

Lag time based on curve matching was 2 days. The lag time model forecast 68.5 sockeye salmon escaping per index point and a final escapement estimate of 1,119,996. The tower count 2 days after the termination of test fishing was 1,214,522. Thus, the forecast escapement based on lag time was an overestimation of 8.4%.

The catchability model utilizing running mean length forecast 72.6 sockeye salmon escaping per index point and a final escapement estimate of 1,286,363. Thus, the catchability model overforecast the actual escapement 2 days later by 14.9%.

#### Egegik River

Test fishing began 25 June and continued through 12 July. This was the fourth season that the upriver site was used. The data collected from this site has provided a reliable forecast of the escapement for all four seasons. At the end of the season 1,198 sockeye salmon had been caught, resulting in 30,361.16 daily index points. The mean length was 568.75 mm and mean weight was 2.97 kg (Table 2 and Appendix Table 4). Data by set and station is presented in Appendix Table 5).

Lag time based on curve matching was 3 days. This yielded an estimated 34.2 sockeye salmon passing the test fishery per daily index point or a forecast escapement of 1,038,352. The tower count 3 days after the termination of test fishing was 1,029,684. Thus, there was little difference (0.8%) between the final forecast and the escapement 3 days later.

The catchability model estimated 28.8 sockeye salmon passing per index point and a final forecast escapement of 874,401. This was an underestimation of 15.1%.

#### Ugashik River

Test fishing began 25 June and ended 15 July. The fishing stations used in 1982 indicated a minimum of fish milling and will be used again in 1983. At the termination of test fishing 880 sockeye salmon had been captured resulting in 48,056.64 daily index points. The mean sockeye length was 571.76 mm with a mean weight of 3.12 kg (Table 3, Appendix Table 6). Data by set and station is presented in Appendix Table 7.

Lag time between the test fishery and the counting tower was estimated to be 3 days based on curve matching. This yielded an estimated 29.4 sockeye salmon per daily index point or a forecast escapement of 1,412,865. The tower count 3 days after the termination of test fishing was 1,107,714. As a result the lag time model overforecast by 27.5%.

The catchability model using running mean length estimated 21.4 sockeye salmon passing per daily index point and a forecast escapement of 1,028,412 fish. Thus the forecast escapement using the catchability model was an underestimate of 7.2%.

Table 2. Sockeye salmon escapement test fish summary data, Egegik River, 1982

DATE	FISHING TIME	CATCH	INDEX	ACCUMULATIVE INDEX	MEAN WEIGHT	MEAN LENGTH	RUNNING MEAN LENGTH
6 18	29.90	4.00	33.40	33.40	3.50	586.31	586.31
6 19	47.80	15.00	70.96	104.36	3.60	591.31	589.71
6 20	91.29	27.00	89.69	194.06	3.27	583.93	586.06
6 21	26.77	7.00	90.61	284.67	2.73	544.00	575.88
6 22	94.10	9.00	22.33	307.00	3.46	595.64	577.98
6 23	106.60	2.00	3.92	310.92	3.70	616.00	578.68
6 24	91.40	3.00	7.17	318.10	1.23	496.45	576.01
6 25	78.40	3.00	11.74	329.84	3.17	590.32	576.73
6 26	89.10	66.00	221.72	551.56	3.38	580.29	578.47
6 27	46.90	53.00	621.04	1172.60	3.38	575.45	576.73
6 28	55.90	77.00	715.19	1887.79	3.15	578.19	577.31
6 29	89.30	9.00	31.79	1919.58	3.00	570.59	577.19
6 30	98.40	11.00	31.03	1950.61	2.70	557.29	576.86
7 1	21.10	122.00	2563.93	4514.54	2.94	557.72	565.75
7 2	5.00	59.00	2645.45	7159.99	3.07	561.18	564.70
7 3	92.70	22.00	80.95	7240.94	2.75	569.23	564.76
7 4	99.40	5.00	11.87	7252.81	3.13	582.25	564.79
7 5	52.50	59.00	324.72	7577.54	3.04	559.98	564.54
7 6	26.60	161.00	3854.81	11432.35	3.14	568.00	565.87
7 7	5.70	101.00	4953.33	16385.68	3.08	575.63	569.10
7 8	5.57	104.00	5019.81	21405.49	2.55	570.47	569.45
7 9	26.30	125.00	3770.95	25176.44	3.07	565.11	568.76
7 10	9.20	103.00	4635.82	29812.26	2.97	570.01	568.96
7 11	62.60	42.00	504.59	30316.84	2.91	561.01	568.82
7 12	84.50	9.00	44.31	30361.16	2.40	524.00	568.75
MEAN TOTAL		1198	30361.16		2.97	568.75	

Table 3. Sockeye salmon escapement test fish summary data, Ugashik River, 1982

DATE	FISHING TIME	CATCH	INDEX	ACCUMULATIVE INDEX	MEAN WEIGHT	MEAN LENGTH	RUNNING MEAN LENGTH
6 25	19.00	1.00	13.33	13.33	0.00	601.00	601.00
6 26	13.50	1.00	15.00	28.33	0.00	612.00	606.82
6 27	32.50	0.00	0.00	28.33	0.00	0.00	606.82
6 28	26.00	0.00	0.00	28.33	0.00	0.00	606.82
6 29	36.00	4.00	27.91	56.24	3.63	595.93	599.60
6 30	25.50	9.00	92.57	148.81	3.37	590.07	594.61
7 1	60.00	9.00	34.66	183.47	3.13	589.10	593.06
7 2	37.50	2.00	8.89	192.36	2.90	611.00	593.68
7 3	62.50	5.00	25.60	217.96	3.62	593.36	593.63
7 4	71.50	1.00	2.31	220.26	3.30	621.00	594.04
7 5	44.50	2.00	8.28	228.54	3.55	621.00	595.40
7 6	51.61	10.00	73.11	301.65	1.74	530.81	575.45
7 7	29.30	30.00	243.70	545.35	3.13	580.72	578.12
7 8	8.30	108.00	4308.11	4853.46	3.38	581.88	581.50
7 9	3.30	77.00	5886.75	10740.21	3.35	571.94	576.23
7 10	4.00	103.00	6366.67	17106.87	3.24	579.16	577.32
7 11	1.60	44.00	6438.10	23544.97	3.18	569.59	576.10
7 12	3.82	122.00	7451.14	30996.11	2.91	563.31	572.66
7 13	4.60	265.00	12937.24	43933.35	3.04	571.63	572.33
7 14	4.60	56.00	3066.10	46999.45	3.03	568.97	572.10
7 15	11.90	31.00	1057.20	48056.64	3.08	557.69	571.76
MEAN TOTAL		880.00	48056.64		3.12	571.76	

Appendix Table 1. Historic data on mean weight, mean length, and return per index values for Kvichak, Egegik, and Ugashik test fisheries.

KVICHAK RIVER			
Year	Mean Weight (kg) <sup>1</sup>	Mean Length (mm) <sup>2</sup>	Return/Index
1969	2.31	509.1	441
1970	2.18	498.6	614
1971	2.54	536.1	149
1972	2.77	540.9	79
1973	3.04	533.1	43
1974	-	-	-
1975	2.39	507.0	222
1976	2.63	508.6	160
1977	3.08	533.1	97
1978	2.39	498.8	147
1979	2.50	519.3 <sup>3</sup>	227
1980	2.20	514.6 <sup>3</sup>	161
1981	2.54	528.8 <sup>3</sup>	84
1982	2.56	532.3 <sup>3</sup>	69

<sup>1</sup> From commercial processors reports.

<sup>2</sup> From tower samples.

<sup>3</sup> From inside test fish samples.

$$Y = ax^b$$

$Y = \text{Return/Index}$   
 $x = \text{Mean Length (mm)}$   
 $a = 7.29 \times 10^{86}$   
 $b = -31.180$   
 $R^2 = 0.7696$

Note: only 1979-1982 included in power progression

-Continued-

Appendix Table 1. Historic data on mean weight, mean length, and return per index values for Kvichak, Egegik, and Ugashik test fisheries (continued).

EGEGIK RIVER			
Year	Mean Weight (kg) <sup>1</sup>	Mean Length (mm) <sup>2</sup>	Return/Index
1969	2.49	531.5	239
1970	2.18	494.1	202
1971	2.68	559.4	221
1972	2.72	529.5	184
1973	3.22	586.1	75
1974	-	-	-
1975	2.58	551.6	74
1976	2.68	545.1	54
1977	2.87	565.7	103
1978	3.04 <sup>3</sup>	566.1 <sup>3</sup>	59
1979	2.69 <sup>3</sup>	546.5 <sup>3</sup>	43 <sup>4</sup>
1980	2.19 <sup>3</sup>	524.6 <sup>3</sup>	85 <sup>4</sup>
1981	2.65 <sup>3</sup>	544.0 <sup>3</sup>	38 <sup>4</sup>
1982	2.97 <sup>3</sup>	568.7 <sup>3</sup>	33 <sup>4</sup>

<sup>1</sup> From commercial processors reports.

<sup>2</sup> From tower samples.

<sup>3</sup> From inside test fish samples.

<sup>4</sup> Return / index values are not comparable with those of prior years due to relocation of test fish project upriver.

$$Y = aX^b$$

$Y = \text{Return/Index}$   
 $X = \text{Mean Length (mm)}$   
 $a = 9.574 \times 10^{32}$   
 $b = -11.442$   
 $R^2 = 0.8103$

Note: only 1979-1982 used in power progression

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Appendix Table 1. Historic data on mean weight, mean length, and return per index values for Kvichak, Egegik, and Ugashik test fisheries (continued).

UGASHIK RIVER			
Year	Mean Weight (kg) <sup>1</sup>	Mean Length (mm) <sup>2</sup>	Return/Index
1961	-	574.8	26
1962	-	537.7	15
1963	2.81	543.8	38
1964	2.40	510.0	23
1965	2.40	495.9	51
1966	2.95	555.0	51
1967	2.86	555.3	26
1968	2.68	526.2	11
1978	2.90 <sup>3</sup>	543.0	3
1979	2.61 <sup>3</sup>	538.0 <sup>3</sup>	39
1980	2.30 <sup>3</sup>	520.5 <sup>3</sup>	30
1981	2.92 <sup>3</sup>	560.2 <sup>3</sup>	18
1982	3.12 <sup>3</sup>	571.8 <sup>3</sup>	24

<sup>1</sup> From commercial processors reports.

<sup>2</sup> From tower samples.

<sup>3</sup> From inside test fish samples.

$$Y = a \chi^b$$

$Y = \text{Return/Index}$   
 $\chi = \text{Mean Length (mm)}$   
 $a = 1.06 \times 10^{15}$   
 $b = -4.967$   
 $R^2 = 0.4033$

Note: only 1979-1982 used in power regression

Appendix Table 2. Age, length, weight statistics for sockeye sampled from the Kvichak River test fishery, 1982.

	Age Group					Total
	42	52	53	62	63	
<b>MALES</b>						
PERCENT	32.70	9.20	3.00	0.00	2.50	47.40
AV LENGTH	514.90	577.60	549.60	0.00	605.30	534.03
STD ERROR	1.99	4.82	4.20	0.00	7.04	1.72
SAMP SIZE	151	43	14	0	12	220
AV WEIGHT	2.30	3.30	2.80	0.00	3.80	2.60
STD ERROR	.10	.22	.12	0.00	.35	.09
SAMP SIZE	24	13	3	0	3	43
<b>FEMALES</b>						
PERCENT	35.90	14.00	1.70	.40	.60	52.60
AV LENGTH	510.20	562.80	520.10	589.50	553.70	525.62
STD ERROR	1.88	3.09	7.92	33.52	17.72	1.58
SAMP SIZE	166	65	8	2	3	244
AV WEIGHT	2.10	2.60	2.40	0.00	2.80	2.25
STD ERROR	.08	.16	0.00	0.00	.28	.07
SAMP SIZE	27	10	1	0	2	40
<b>SEXES COMBINED</b>						
PERCENT	68.60	23.20	4.70	.40	3.10	100.00
AV LENGTH	512.44	568.67	538.93	589.50	595.31	529.61
STD ERROR	1.36	2.67	3.93	33.52	6.66	1.17
SAMP SIZE	317	108	22	2	15	464
AV WEIGHT	2.20	2.88	2.66	0.00	3.61	2.42
STD ERROR	.06	.14	.09	0.00	.24	.06
SAMP SIZE	51	23	4	0	5	83

Appendix table 3. Test fish sockeye catch, mean fishing time, index, mean weight (kg), mean length (mm) by set, Kvichak River, 1982.

MO	DA	SET NO.	STATION	GEAR LENGTH (FATHOMS)	MEAN FISHING TIME (MIN)	SOCKEYE CATCH	TEST FISHING INDEX (DAILY)	MEAN WT	MEAN LN	T I D E
6	21	1	1	50	29.000	1	4.1	2.68	538.40	4
6	21	2	2	50	13.000	8	73.8	2.00	544.00	4
6	22	3	1	50	19.000	1	6.3	3.10	556.00	4
6	22	4	2	50	11.000	0	0.0	0.00	0.00	4
6	22	5	1	50	24.000	1	5.0	1.82	500.00	4
6	22	6	2	50	16.500	0	0.0	0.00	0.00	4
6	23	7	1	50	19.000	1	6.3	1.93	522.00	4
6	23	8	2	50	13.000	0	0.0	0.00	0.00	4
6	23	9	1	50	28.500	1	4.2	1.92	506.00	4
6	23	10	2	50	29.000	0	0.0	0.00	0.00	4
6	24	11	1	50	18.000	0	0.0	0.00	0.00	4
6	24	12	2	50	15.500	0	0.0	0.00	0.00	4
6	24	13	1	50	33.000	0	0.0	0.00	0.00	4
6	24	14	2	50	22.500	0	0.0	0.00	0.00	4
6	25	15	1	50	19.500	0	0.0	0.00	0.00	4
6	25	16	2	50	15.500	0	0.0	0.00	0.00	4
6	25	17	1	50	29.000	1	4.1	1.87	515.00	4
6	25	18	2	50	20.000	0	0.0	0.00	0.00	4
6	26	19	1	50	30.000	0	0.0	0.00	0.00	4
6	26	20	2	50	16.000	0	0.0	0.00	0.00	4
6	26	21	1	50	36.500	0	0.0	0.00	0.00	4
6	26	22	2	50	21.500	0	0.0	0.00	0.00	4
6	27	23	2	50	11.000	0	0.0	0.00	0.00	4
6	27	24	1	50	16.500	0	0.0	0.00	0.00	4
6	27	25	1	50	18.000	4	26.7	2.32	527.30	4
6	27	26	2	50	20.000	0	0.0	0.00	0.00	4
6	28	27	1	25	7.000	0	0.0	0.00	0.00	4
6	28	28	2	25	10.500	0	0.0	0.00	0.00	4
6	28	29	1	25	6.000	5	200.0	2.62	534.60	4
6	28	30	2	25	20.500	1	11.7	2.42	533.00	4
6	29	31	1	25	3.000	36	2880.0	3.05	526.70	4
6	29	32	2	25	9.500	10	252.6	2.68	537.20	4
6	29	33	2	25	9.000	5	133.3	2.99	531.40	4
6	29	34	1	25	11.500	1	20.9	2.72	556.00	4
6	30	35	1	25	9.500	1	25.3	2.08	523.00	4
6	30	36	2	25	9.500	0	0.0	0.00	0.00	4
7	1	37	1	25	15.500	0	0.0	0.00	0.00	4
7	1	38	2	25	14.500	3	49.7	1.85	535.30	4
7	1	39	1	25	20.500	1	11.7	2.22	528.00	4
7	1	40	2	25	16.000	0	0.0	0.00	0.00	4
7	2	41	1	25	12.500	0	0.0	0.00	0.00	4
7	2	42	2	25	6.500	33	1218.5	2.17	508.76	4
7	2	43	1	25	11.500	12	250.4	2.42	529.50	4
7	2	44	2	25	11.000	0	0.0	0.00	0.00	4
7	3	45	1	25	14.000	14	240.0	2.29	514.40	4
7	3	46	2	25	14.000	5	85.7	2.48	516.50	4

-Continued-

Appendix table 3. Test fish sockeye catch, mean fishing time, index, mean weight (kg), mean length (mm) by set, Kvichak River, 1982 (continued).

MO	DA	SET NO.	STATION	GEAR LENGTH (FATHOMS)	MEAN FISHING TIME (MIN)	SOCKEYE CATCH	TEST FISHING INDEX (DAILY)	MEAN WT	MEAN LN	T I D E
6	21	1	1	50	29.000	1	4.1	2.68	538.40	4
6	21	2	2	50	13.000	8	73.8	2.00	544.00	4
6	22	3	1	50	19.000	1	6.3	3.10	556.00	4
6	22	4	2	50	11.000	0	0.0	0.00	0.00	4
6	22	5	1	50	24.000	1	5.0	1.82	500.00	4
6	22	6	2	50	16.500	0	0.0	0.00	0.00	4
6	23	7	1	50	19.000	1	6.3	1.93	522.00	4
6	23	8	2	50	13.000	0	0.0	0.00	0.00	4
6	23	9	1	50	28.500	1	4.2	1.92	506.00	4
6	23	10	2	50	29.000	0	0.0	0.00	0.00	4
6	24	11	1	50	18.000	0	0.0	0.00	0.00	4
6	24	12	2	50	15.500	0	0.0	0.00	0.00	4
6	24	13	1	50	33.000	0	0.0	0.00	0.00	4
6	24	14	2	50	22.500	0	0.0	0.00	0.00	4
6	25	15	1	50	19.500	0	0.0	0.00	0.00	4
6	25	16	2	50	15.500	0	0.0	0.00	0.00	4
6	25	17	1	50	29.000	1	4.1	1.87	515.00	4
6	25	18	2	50	20.000	0	0.0	0.00	0.00	4
6	26	19	1	50	30.000	0	0.0	0.00	0.00	4
6	26	20	2	50	16.000	0	0.0	0.00	0.00	4
6	26	21	1	50	36.500	0	0.0	0.00	0.00	4
6	26	22	2	50	21.500	0	0.0	0.00	0.00	4
6	27	23	2	50	11.000	0	0.0	0.00	0.00	4
6	27	24	1	50	16.500	0	0.0	0.00	0.00	4
6	27	25	1	50	18.000	4	26.7	2.32	527.30	4
6	27	26	2	50	20.000	0	0.0	0.00	0.00	4
6	28	27	1	25	7.000	0	0.0	0.00	0.00	4
6	28	28	2	25	10.500	0	0.0	0.00	0.00	4
6	28	29	1	25	6.000	5	200.0	2.62	534.60	4
6	28	30	2	25	20.500	1	11.7	2.42	533.00	4
6	29	31	1	25	3.000	36	2880.0	3.05	526.70	4
6	29	32	2	25	9.500	10	252.6	2.68	537.20	4
6	29	33	2	25	9.000	5	133.3	2.99	531.40	4
6	29	34	1	25	11.500	1	20.9	2.72	556.00	4
6	30	35	1	25	9.500	1	25.3	2.08	523.00	4
6	30	36	2	25	9.500	0	0.0	0.00	0.00	4
7	1	37	1	25	15.500	0	0.0	0.00	0.00	4
7	1	38	2	25	14.500	3	49.7	1.85	535.30	4
7	1	39	1	25	20.500	1	11.7	2.22	528.00	4
7	1	40	2	25	16.000	0	0.0	0.00	0.00	4
7	2	41	1	25	12.500	0	0.0	0.00	0.00	4
7	2	42	2	25	6.500	33	1218.5	2.17	508.76	4
7	2	43	1	25	11.500	12	250.4	2.42	529.50	4
7	2	44	2	25	11.000	0	0.0	0.00	0.00	4
7	3	45	1	25	14.000	14	240.0	2.29	514.40	4
7	3	46	2	25	14.000	5	85.7	2.48	516.50	4

Appendix table 4. Age, length, weight statistics for sockeye sampled from the Egegik River test fishery, 1982.

	AGE GROUP								TOTAL
	32	42	43	52	53	62	63	74	
<b>MALES</b>									
PERCENT	.40	5.30	.30	25.20	6.10	.10	11.70	.10	49.20
AV LENGTH	478.50	531.30	379.70	593.10	542.60	630.00	595.30	573.00	578.51
STD ERROR	55.70	3.00	.87	1.73	3.12	0.00	2.57	0.00	1.28
SAMP SIZE	4	52	3	243	60	1	114	1	478
AV WEIGHT	1.00	2.70	.70	3.60	2.70	0.00	3.60	3.40	3.35
STD ERROR	0.00	.11	0.00	.06	.12	0.00	.08	0.00	.04
SAMP SIZE	1	14	1	80	18	0	41	1	156
<b>FEMALES</b>									
PERCENT	.10	4.70	0.00	27.60	9.20	0.00	9.20	0.00	50.80
AV LENGTH	474.00	516.40	0.00	574.90	526.40	0.00	580.70	0.00	561.56
STD ERROR	0.00	3.39	0.00	1.33	2.03	0.00	2.04	0.00	.94
SAMP SIZE	1	46	0	267	90	0	90	0	494
AV WEIGHT	0.00	2.10	0.00	3.00	2.10	0.00	3.10	0.00	2.77
STD ERROR	0.00	.11	0.00	.03	.05	0.00	.05	0.00	.03
SAMP SIZE	0	14	0	77	32	0	30	0	153
<b>SEXES COMBINED</b>									
PERCENT	.50	10.00	.30	52.80	15.30	.10	20.90	.10	100.00
AV LENGTH	477.60	524.30	379.70	583.59	532.86	630.00	588.87	573.00	569.90
STD ERROR	44.56	2.25	.87	1.08	1.75	0.00	1.69	0.00	.79
SAMP SIZE	5	98	3	510	150	1	204	1	972
AV WEIGHT	1.00	2.42	.70	3.29	2.34	0.00	3.38	3.40	3.06
STD ERROR	0.00	.08	0.00	.03	.05	0.00	.05	0.00	.02
SAMP SIZE	1	28	1	157	50	0	71	1	309

Appendix table 5. Test fish sockeye catch, mean fishing time, index, mean weight (kg), mean length (mm) by set, Egegik river, 1982.

MO	DA	SET NO.	STATION	GEAR LENGTH (FATHOMS)	MEAN FISHING TIME (MIN)	SOCKEYE CATCH	TEST FISHING INDEX (DAILY)	MEAN WT	MEAN LN	T I D E
6	18	1	1	25	16.000	1	15.0	3.40	577.00	4
6	18	2	2	25	13.900	3	51.8	3.53	589.00	4
6	19	3	1	25	17.900	4	53.6	3.40	587.70	4
6	19	4	2	25	29.900	11	88.3	3.72	593.50	4
6	20	5	1	25	25.830	2	18.6	3.40	593.00	4
6	20	6	2	25	28.130	16	136.5	3.15	571.70	4
6	20	7	1	25	29.290	3	24.6	3.09	591.30	4
6	20	8	2	25	8.040	6	179.1	3.38	591.30	4
6	21	9	1	25	17.500	0	0.0	0.00	0.00	4
6	21	10	2	25	9.270	7	181.2	2.73	544.00	4
6	22	11	1	25	19.900	1	12.1	3.60	583.00	4
6	22	12	2	25	24.500	5	49.0	3.45	605.00	4
6	22	13	1	25	30.800	2	15.6	3.65	592.00	4
6	22	14	2	25	18.900	1	12.7	3.10	576.00	4
6	23	15	1	25	25.100	0	0.0	0.00	0.00	4
6	23	16	2	25	21.000	0	0.0	0.00	0.00	4
6	23	17	1	25	29.900	0	0.0	0.00	0.00	4
6	23	18	2	25	30.600	2	15.7	3.70	616.00	4
6	24	19	1	25	21.200	0	0.0	0.00	0.00	4
6	24	20	2	25	16.500	0	0.0	0.00	0.00	4
6	24	21	1	25	30.700	1	7.8	1.78	511.00	4
6	24	22	2	25	23.000	2	20.9	1.02	491.00	4
6	25	23	1	25	27.500	0	0.0	0.00	0.00	4
6	25	24	2	25	15.100	2	31.8	3.15	590.00	4
6	25	25	1	25	20.000	0	0.0	0.00	0.00	4
6	25	26	2	25	15.800	1	15.2	3.20	591.00	4
6	26	27	1	25	24.100	0	0.0	0.00	0.00	4
6	26	28	2	25	22.700	6	63.4	3.45	596.00	4
6	26	29	1	25	24.900	1	9.6	1.84	501.00	4
6	26	30	2	25	17.400	59	813.8	3.39	580.00	4
6	27	31	1	25	17.000	6	84.7	3.50	601.00	4
6	27	32	2	25	5.000	16	768.0	3.69	582.00	4
6	27	33	1	25	22.000	13	141.8	3.49	582.00	4
6	27	34	2	25	2.900	18	1489.7	3.21	570.00	4
6	28	35	1	25	25.500	7	65.9	2.97	573.00	4
6	28	36	2	25	9.300	15	387.1	3.58	574.00	4
6	28	37	1	25	16.400	11	161.0	3.20	579.00	4
6	28	38	2	25	4.700	44	2246.8	3.08	579.00	4
6	29	39	1	25	30.200	2	15.9	3.72	613.00	4
6	29	40	2	25	9.600	3	75.0	2.68	556.00	4
6	29	41	1	25	32.500	3	22.1	3.20	574.00	4
6	29	42	2	25	17.000	1	14.1	3.55	595.00	4
6	30	43	1	25	31.400	2	15.3	3.50	608.00	4
6	30	44	2	25	18.700	2	25.7	1.76	493.00	4
6	30	45	1	25	30.500	2	15.7	4.02	627.00	4

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Appendix table 5. Test fish sockeye catch, mean fishing time, index, mean weight (kg), mean length (mm) by set, Egegik River, 1982 (continue).

MO	DA	SET NO.	STATION	GEAR LENGTH (FATHOMS)	MEAN FISHING TIME (MIN)	SOCKEYE CATCH	TEST FISHING INDEX (DAILY)	MEAN WT	MEAN LN	T I D E
7	1	47	1	25	12.300	29	565.8	3.06	572.00	4
7	1	48	2	25	4.600	26	1356.5	3.04	571.00	4
7	1	49	1	25	2.400	18	1800.0	2.59	564.00	4
7	1	50	2	25	1.800	49	6533.3	3.00	552.00	4
7	2	51	1	25	2.200	10	1090.9	2.95	558.00	4
7	2	52	2	25	2.800	49	4200.0	3.10	562.00	4
7	3	53	1	25	24.500	1	9.8	3.45	611.00	4
7	3	54	2	25	14.400	16	266.7	2.66	567.00	4
7	3	55	1	25	31.300	2	15.3	3.80	613.00	4
7	3	56	2	25	22.500	3	32.1	2.77	554.00	4
7	4	57	1	25	28.800	0	0.0	-----	-----	4
7	4	58	2	25	15.300	1	15.7	1.92	526.00	4
7	4	59	1	25	25.100	0	0.0	-----	-----	4
7	4	60	2	25	30.200	4	31.7	3.72	610.00	4
7	5	61	1	25	18.400	2	26.1	3.62	603.00	4
7	5	62	2	25	11.600	2	41.4	2.97	565.00	4
7	5	63	1	25	12.000	9	180.0	3.10	570.00	4
7	5	64	2	25	10.500	46	1051.4	3.02	557.00	4
7	6	65	1	25	11.700	40	820.0	2.96	564.00	4
7	6	66	2	25	2.500	79	7584.0	2.94	563.00	4
7	6	67	1	25	11.400	14	294.7	3.20	594.00	4
7	6	68	2	25	1.000	28	6720.0	3.38	573.00	4
7	7	69	1	25	1.000	28	6720.0	3.09	573.00	4
7	7	70	2	25	.900	28	7466.7	3.11	578.00	4
7	7	71	1	25	1.800	17	3497.1	3.45	581.00	4
7	7	72	2	25	2.000	28	3291.9	2.72	572.00	4
7	8	73	1	25	1.200	14	2800.0	2.30	554.00	4
7	8	74	2	25	1.000	44	10560.0	3.14	574.00	4
7	8	75	1	25	1.070	16	357.0	-----	562.00	4
7	8	76	2	25	2.300	30	3085.9	2.90	583.00	4
7	9	77	1	25	1.400	21	3600.0	2.82	565.00	4
7	9	78	2	25	1.300	45	8307.7	3.32	567.00	4
7	9	79	1	25	1.500	17	2720.0	2.73	560.00	4
7	9	80	2	25	22.100	42	456.4	2.68	562.00	4
7	10	81	1	25	1.200	33	6600.0	3.13	567.00	4
7	10	82	2	25	.800	28	8400.0	2.69	569.00	4
7	10	83	1	25	5.000	17	783.4	2.76	558.00	4
7	10	84	2	25	2.200	25	2666.7	3.53	584.00	4
7	11	85	1	25	10.800	10	222.2	2.95	565.00	4
7	11	86	2	25	3.600	26	1733.3	2.90	560.00	4
7	11	87	1	25	29.400	3	24.5	1.90	520.00	4
7	11	88	2	25	18.800	3	38.2	3.73	610.00	4
7	12	89	1	25	21.200	0	0.0	-----	-----	4
7	12	90	2	25	11.500	8	170.0	2.29	519.00	4
7	12	91	1	25	28.500	0	0.0	-----	-----	4
7	12	92	2	25	23.300	1	10.3	4.10	605.00	4

Appendix Table 6. Age, length, weight statistics for sockeye sampled from the Ugashik River test fishery, 1982.

	AGE GROUP					TOTAL
	32	42	52	53	63	
<b>MALES</b>						
PERCENT	.30	4.20	27.80	4.40	8.60	45.30
AV LENGTH	392.50	522.20	590.30	531.10	604.70	579.66
STD ERROR	5.52	4.62	2.00	3.45	3.67	1.51
SAMP SIZE	2	25	162	26	51	266
AV WEIGHT	00.0	2.30	3.50	2.40	3.80	3.34
STD ERROR	00.0	.23	.08	.08	.10	.06
SAMP SIZE	0	3	36	6	16	61
<b>FEMALES</b>						
PERCENT	.30	5.70	37.90	2.50	8.30	54.70
AV LENGTH	461.50	510.90	569.80	525.30	577.50	562.20
STD ERROR	122.47	4.39	1.45	5.50	3.43	1.46
SAMP SIZE	2	34	221	15	49	321
AV WEIGHT	3.00	2.10	3.00	2.40	3.20	2.91
STD ERROR	0.00	.16	.06	.25	.11	.05
SAMP SIZE	1	6	47	4	13	71
<b>SEXES COMBINED</b>						
PERCENT	.60	9.90	65.70	6.90	16.90	100.00
AV LENGTH	427.00	515.69	578.47	529.00	591.34	570.11
STD ERROR	61.30	3.20	1.19	2.97	2.51	1.05
SAMP SIZE	4	59	383	41	100	587
AV WEIGHT	3.00	2.18	3.21	2.40	3.51	3.10
STD ERROR	0.00	.13	.05	.11	.07	.04
SAMP SIZE	1	9	83	10	29	132

Appendix table 7. Test fish sockeye catch, mean fishing time, index, mean weight (kg), mean length (mm) by set, Ugashik River, 1982.

MO	DA	SET NO.	STATION	GEAR LENGTH (FATHOMS)	MEAN FISHING TIME (MIN)	SOCKEYE CATCH	TEST FISHING INDEX (DAILY)	MEAN WT	MEAN LN	T I D E
6	25	1	2	25	9.000	1	26.7	0.00	601.00	2
6	25	2	1	25	10.000	0	0.0	0.00	0.00	2
6	26	3	1	25	5.500	0	0.0	0.00	0.00	2
6	26	4	2	25	8.000	1	30.0	0.00	612.00	2
6	27	5	2	25	2.000	0	0.0	0.00	0.00	2
6	27	6	2	25	18.000	0	0.0	0.00	0.00	2
6	27	7	1	25	12.500	0	0.0	0.00	0.00	2
6	28	8	1	25	12.500	0	0.0	0.00	0.00	2
6	28	9	2	25	13.500	0	0.0	0.00	0.00	2
6	29	10	2	25	8.500	2	56.5	3.30	578.50	2
6	29	11	1	25	7.000	1	34.3	3.65	596.00	2
6	29	12	2	25	11.500	1	20.9	4.50	643.00	2
6	29	13	1	25	9.000	0	0.0	0.00	0.00	2
6	30	14	2	25	15.000	3	48.0	3.30	596.00	2
6	30	15	1	25	10.500	6	137.1	3.40	588.00	2
7	1	16	2	25	14.500	2	33.1	3.30	589.00	2
7	1	17	1	25	10.000	1	24.0	2.90	582.00	2
7	1	18	2	25	18.000	2	26.7	3.40	602.00	2
7	1	19	1	25	17.500	4	54.9	3.00	586.00	2
7	2	20	1	25	10.500	0	0.0	0.00	0.00	2
7	2	21	2	25	27.000	2	17.8	2.90	611.00	2
7	3	22	1	25	28.000	0	0.0	0.00	0.00	2
7	3	23	2	25	12.000	2	40.0	3.80	577.00	2
7	3	24	1	25	12.500	2	38.4	3.20	585.00	2
7	3	25	2	25	10.000	1	24.0	4.00	634.00	2
7	4	26	2	25	26.000	1	9.2	3.30	621.00	2
7	4	27	1	25	12.500	0	0.0	0.00	0.00	2
7	4	28	1	25	12.000	0	0.0	0.00	0.00	2
7	4	29	2	25	21.000	0	0.0	0.00	0.00	2
7	5	30	1	25	10.500	0	0.0	0.00	0.00	2
7	5	31	2	25	11.500	0	0.0	0.00	0.00	2
7	5	32	1	25	8.000	0	0.0	0.00	0.00	2
7	5	33	2	25	14.500	2	33.1	3.55	621.00	2
7	6	34	1	25	5.200	1	46.2	2.40	549.00	2
7	6	35	2	25	30.700	0	0.0	0.00	0.00	2
7	6	36	1	25	6.940	0	0.0	0.00	0.00	0
7	6	37	2	25	8.770	9	246.6	1.62	527.40	4
7	7	38	1	25	7.300	2	264.8	3.39	592.40	4
7	7	39	2	25	8.100	11	326.3	2.99	585.50	4
7	7	40	1	25	7.800	10	309.3	3.09	573.80	4
7	7	41	2	25	6.100	7	339.4	3.27	580.00	4
7	8	42	1	25	2.150	41	4576.7	3.23	619.60	4
7	8	43	2	25	4.250	22	1242.4	3.69	581.80	4
7	8	44	1	25	1.000	22	5280.0	3.54	563.00	4
7	8	45	2	25	.900	23	6260.0	3.30	570.00	4
7	9	46	1	25	.750	23	7360.0	3.08	566.00	4

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Appendix table 7. Test fish sockeye catch, mean fishing time, index, mean weight (kg), mean length (mm) by set, Ugashik River, 1982 (continued).

MO	DA	SET NO.	STATION	GEAR LENGTH (FATHOMS)	MEAN FISHING TIME (MIN)	SOCKEYE CATCH	TEST FISHING INDEX (DAILY)	MEAN WT	MEAN LN	T I D E
7	9	47	2	25	.750	20	7680.0	3.85	570.00	4
7	9	48	1	25	1.100	15	3913.0	3.23	579.00	4
7	9	49	2	25	.700	19	6514.3	3.23	577.00	4
7	10	50	1	25	1.200	16	3200.0	2.83	575.00	4
7	10	51	2	25	.900	32	8533.3	3.67	597.00	4
7	10	52	1	25	.900	20	5333.3	3.02	577.00	4
7	10	53	2	25	1.000	35	8400.0	3.11	564.00	4
7	11	54	1	25	.700	15	5142.9	3.25	575.00	4
7	11	55	2	25	.900	29	7733.3	3.13	566.00	4
7	12	56	1	25	.800	16	4800.0	2.99	587.00	4
7	12	57	2	25	1.100	47	10254.0	2.93	567.00	4
7	12	58	1	25	.960	15	3750.0	2.52	559.00	4
7	12	59	2	25	.960	44	11000.0	2.99	551.00	4
7	13	60	1	25	1.100	100	2181.8	3.18	578.00	4
7	13	61	2	25	1.300	37	6830.8	3.03	570.00	4
7	13	62	1	25	.800	9	2700.0	3.20	582.00	4
7	13	63	2	25	1.400	119	20400.0	2.87	564.00	4
7	14	64	1	25	1.700	13	1835.3	3.04	565.00	4
7	14	65	2	25	1.000	33	7920.0	2.82	558.00	4
7	14	66	1	25	.800	4	1200.0	3.60	606.00	4
7	14	67	2	25	1.100	6	1309.0	3.72	607.00	4
7	15	68	1	25	1.000	1	240.0	2.68	574.00	4
7	15	69	2	25	1.500	23	3680.0	3.10	555.00	4
7	15	70	1	25	3.300	1	72.7	0.00	0.00	4
7	15	71	2	25	6.100	6	236.1	3.25	583.00	4

# 1982 IGUSHIK RIVER ESCAPEMENT TEST FISHING

By

Wesley A. Bucher  
Alaska Department of Fish and Game  
Division of Commercial Fisheries  
Dillingham, Alaska

## INTRODUCTION

The Igushik River test fishing project was initiated in 1976 (McBride 1978) and has been conducted annually since that time (McBride and Clark 1979; Minard 1982). The objective of the project is to obtain timely estimates of sockeye salmon (*Oncorhynchus nerka*) escapement into the lower portion of the Igushik River immediately after the fish have passed through the commercial fishery (Figure 1). The early estimates are used to facilitate management decisions since the final enumeration of the Igushik River escapement occurs five to ten days later at the outlet of Amanka Lake.

## METHODS AND MATERIALS

### Test Fishing

The fishing site on the Igushik River was the same location as that used 1980-81 since tagging studies have shown that flushing of fish back out of the river from that location is not a problem (McBride 1980). A 25 fm gillnet (5-3/8 inch mesh) was fished during each high tide at a single site in the left bank facing upstream. Actual fishing methods were consistent with past years. The gillnet was set 15 minutes before each high tide as indicated in the local tide tables and remained fishing 30 minutes or until approximately 25 salmon were caught, whichever came first. The objective was to minimize the catch while still obtaining a good estimate of fish passage rates. The standard test fish index of catch per 100 fathom-hours (183 m) was calculated for each set. Length and weight measurements were obtained from at least 10 fish caught in each set throughout the migration.

### Escapement Estimates

Test fish indices were calculated for each high tide and averaged for each day to yield a daily test fish index value. Intra-season estimates of the cumulative escapement at the test fishing site for a given day were calculated using a catchability factor. This factor was generated by multiplying the cumulative test fish index for that day by the best estimate of the number of spawners (at Amanka Lake) per index point at that time. Intra-season estimates of catchability were determined in two ways. First, catchability was estimated from the relationship between the average weight of sockeye caught in the test fishery and estimates of catchability factors determined in prior years. Second, catchability was calculated by correlating cumulative test fish indices appropriately lagged with cumulative tower counts at Amanka Lake (Paulus 1968).

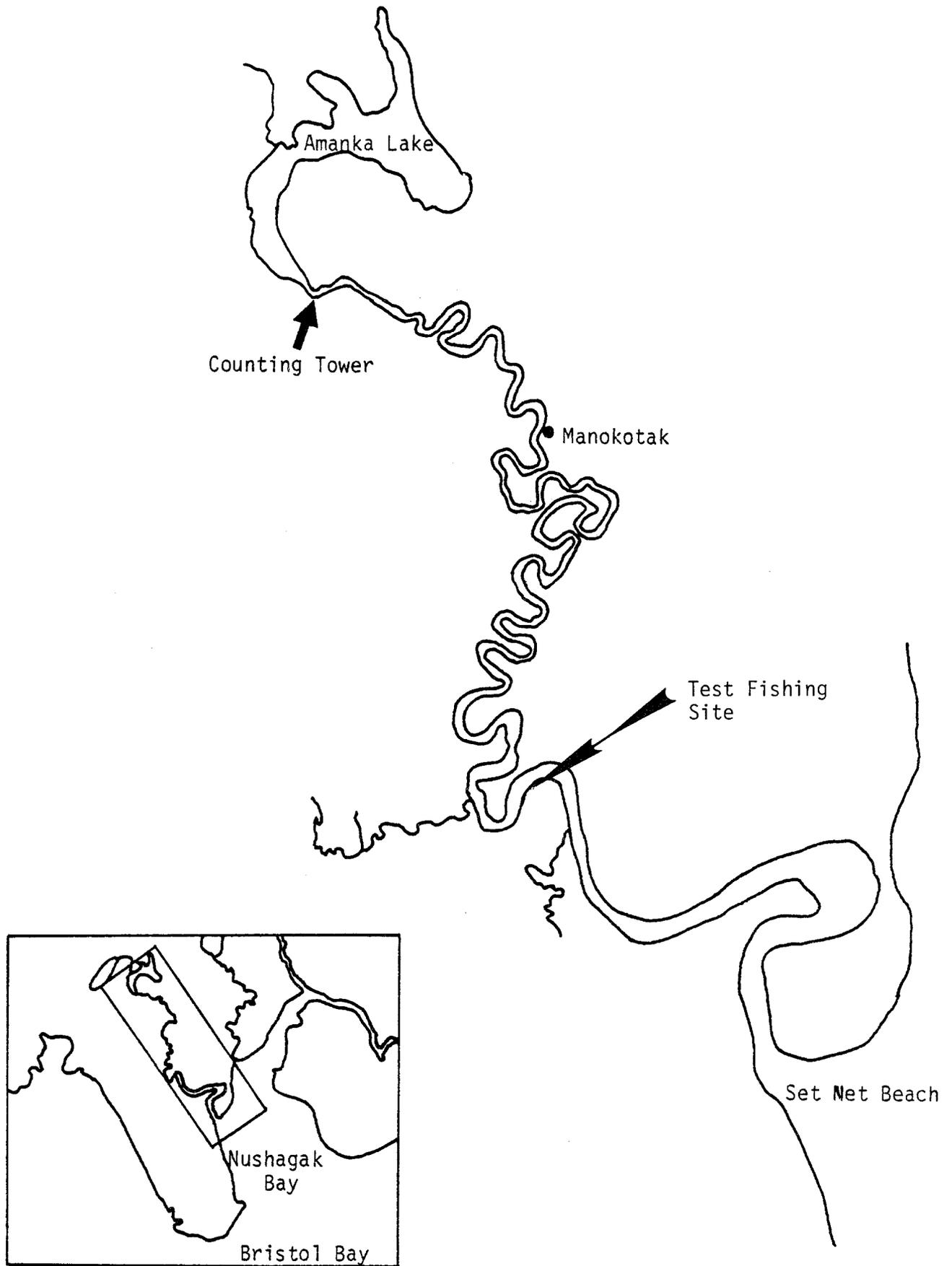


Figure 1. Location of the Igushik River counting tower, the village of Manokotak and the Igushik inside test fishing site.

## RESULTS AND DISCUSSION

Test fishing was conducted from 19 June until 12 July (Table 1). Cumulative test fish indices closely paralleled cumulative tower escapement counts during the season (Figure 2). Test fish indices were used to estimate escapement in-season by periodically adjusting catchability and lag timing factors (Table 2). Correlation analysis showed that a 5-day lag time provided the best statistical fit between test fish indices and tower counts (Table 3). Lag time calculated for past years have ranged between 2 and 7 days (Table 4). Using a 5-day lag time and a catchability factor of 32.55 spawners per index point, successive 1982 escapement estimates approached to within 60% of tower escapement counts by 28 June, when 22% of the total escapement had entered the river (Table 5). After 30 June, when about 50% of the total escapement had entered the river, successive escapement estimates remained within 10% or less of the tower escapement estimate.

The relationship between mean weight of sockeye salmon caught at the test fish site and spawners per index point was examined for data from 1976-1982 using regression analysis (Table 6 and Figure 3). A catchability factor of 19.11 spawners per index point, based upon a mean sockeye salmon weight of 3.5 kg, was generated from this equation for estimating 1982 escapement. This catchability factor produced a total escapement estimate of 241,506 sockeye salmon, accounting for only 59% of actual total escapement.

Table 1. Sockeye salmon escapement into Igushik River system as indexed at the test fish site and enumerated at the tower at Amanka Lake, 1982.

Date	Test Fish Indices		Tower Count	
	Index <sup>1</sup>	Accum.	Daily	Accum.
June 19	42.4	42.4	0	0
June 20	32.6	75.0	0	0
June 21	28.0	103.0	0	0
June 22	395.6 <sup>2</sup>	498.6	0	0
June 23	763.1	1,261.7	0	0
June 24	522.4	1,784.1	0	0
June 25	449.6	2,233.7	0	0
June 26	648.5 <sup>3</sup>	2,882.2	0	0
June 27	688.3	3,570.5	0	0
June 28	810.7	4,381.2	12,858	12,858
June 29	916.2	5,297.4	0	12,858
June 30	1,321.4	6,618.8	2,718	15,576
July 01	992.5	7,611.3	34,626	50,202
July 02	748.8	8,360.1	5,448	55,650
July 03	1,190.8	9,550.9	34,518	90,168
July 04	1,219.5	10,770.4	40,380	130,548
July 05	604.4	11,375.0	56,370	186,918
July 06	213.0	11,588.0	63,426	250,344
July 07	347.2	11,935.2	37,752	288,096
July 08	331.6	12,266.8	27,960	316,056
July 09	150.0	12,416.8	16,014	332,070
July 10	105.3	12,522.1	32,310	364,380
July 11	51.1	12,573.2	13,386	377,766
July 12	64.5	12,637.7	9,420	387,186
July 13			5,514	392,700
July 14			4,098	396,798
July 15			5,520	402,318
July 16			5,232	407,550
July 17			3,870	411,420
July 18			4,830	416,250
July 19			3,390	419,640
July 20			2,418	422,058
July 21			1,386	423,444
July 22			324	423,768

<sup>1</sup> The daily index is the average of both high tides for each day.

<sup>2</sup> Data were not observed, but supplied by linear interpolation.

<sup>3</sup> Data for the A.M. tide were not observed, but supplied by linear interpolation, then averaged with the P.M. index.

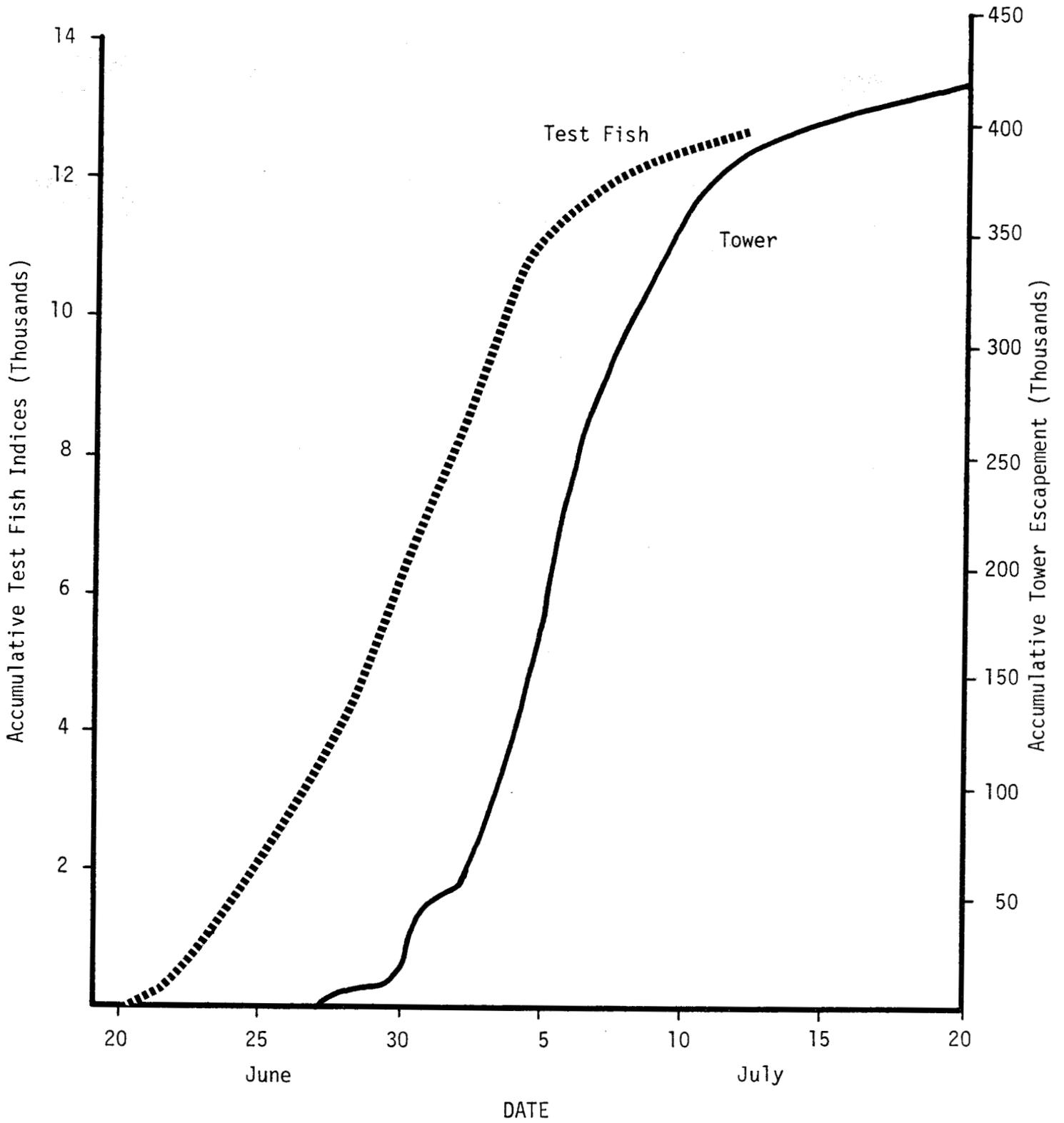


Figure 2. Igushik River accumulative test fishing indices and tower counts, 1982.

Table 2. Accumulative test fish indices and fish per index point used in-season to estimate escapement past the Igushik River test fish site, 1982.

Date	Accumulated Test Fish Index	Fish Per Index Pt. <sup>1</sup>	Estimated Escapement
June 19	42.4	15	1,380
20	75.0	15	1,125
21	103.0	15	1,545
22	498.6	15	7,479
23	1,261.7	15	18,926
24	1,784.1	15	26,762
25	2,233.7	15	33,506
26	2,882.2	15	43,233
27	3,570.5	15	53,558
28	4,381.2	9	39,431
29	5,297.4	9	47,677
30	6,618.8	9	59,569
July 1	7,611.3	13	98,947
2	8,360.1	13	108,681
3	9,550.9	14	133,713
4	10,770.4	14	150,786
5	11,375.0	14	159,250
6	11,588.0	14	162,232
7	11,935.2	14	167,093
8	12,266.8	14	171,735
9	12,416.8	14	173,835
10	12,522.1	41	513,406
11	12,573.2	41	515,501
12	12,637.7	41	518,146

<sup>1</sup> Fish per index point reported here was that value used by the area management biologist in season, and was periodically adjusted based on catchability and lag timing factors.

Table 3. Correlation of cumulative test fish indices with cumulative escapement at Igushik tower with various lag times, 1982.

Lag Time	Correlation Coefficient
2 Day Lag	.94816
3 Day Lag	.97085
4 Day Lag	.98570
5 Day Lag	.99333 <sup>1</sup>
6 Day Lag	.99318
7 Day Lag	.98555

<sup>1</sup> Five-day lag time demonstrated highest correlation coefficient and was used in this analysis.

Table 4. Correlation of cumulative test fish indices with cumulative escapement used to calculate lag time between the test fish site and the tower, 1976-82.

Year	Correlation Coefficient	Lag Time
1976 <sup>1</sup>	.99305	7 Days
1977 <sup>1</sup>	.97734	7 Days
1978 <sup>1</sup>	.99761	7 Days
1979	.99843	2 Days
1980	.99842	4 Days
1981	.99928	4 Days
1982	.99333	5 Days

<sup>1</sup> Correlation is between estimated escapement at the test fish site and the actual escapement enumerated at the tower; subsequent years correlate accumulative test fish indices with actual escapement.

Table 5. Sockeye salmon escapement into the Igushik River system as estimated by the Igushik River inside test fishing project, 1982.

Date	Accumulative Test Fish Index	Estimated Escapement <sup>1</sup>	Actual Escapement <sup>2</sup>	Accuracy <sup>3</sup>
June 19	42.4	1,380	0	-
20	75.0	2,441	0	-
21	103.0	3,353	0	-
22	498.6	16,229	0	-
23	1,261.7	41,068	12,858	3.2
24	1,784.1	58,072	12,858	4.5
25	2,233.7	72,707	15,576	4.7
26	2,882.2	93,816	50,202	1.9
27	3,570.5	116,220	55,650	2.1
28	4,381.2	142,608	90,168	1.6
29	5,297.4	172,430	130,548	1.3
30	6,618.8	215,442	186,918	1.2
July 1	7,611.3	247,748	250,344	1.0
2	8,360.1	272,121	288,096	0.9
3	9,550.9	310,882	316,056	1.0
4	10,770.4	350,577	332,070	1.1
5	11,375.0	370,256	364,380	1.0
6	11,588.0	377,189	377,766	1.0
7	11,935.2	388,491	387,186	1.0
8	12,266.8	399,284	392,700	1.0
9	12,416.8	404,167	396,798	1.0
10	12,522.1	407,594	402,318	1.0
11	12,573.2	409,258	407,550	1.0
12	12,637.7	411,357	411,420	1.0

<sup>1</sup> Estimated escapement = (Accum. test fish index) X (No. spawners/index point).

<sup>2</sup> Actual escapement = Accum. tower count on day n+5 (5-day lag time).

<sup>3</sup> Accuracy = estimated escapement/actual escapement.

Table 6. Individual mean weight and spawners per index point of sockeye salmon caught at Igushik River test fishing site, 1976-82.

Year	Mean Weight (Kg)	Spawners Per Index Point
1976	3.0 <sup>1</sup>	46.8
1977	3.6 <sup>1</sup>	13.1
1978	3.0	40.4
1979	3.4	17.4
1980	3.1	50.3
1981	3.3	14.0
1982	3.5	32.6

<sup>1</sup> Weight data from Igushik section commercial catch.

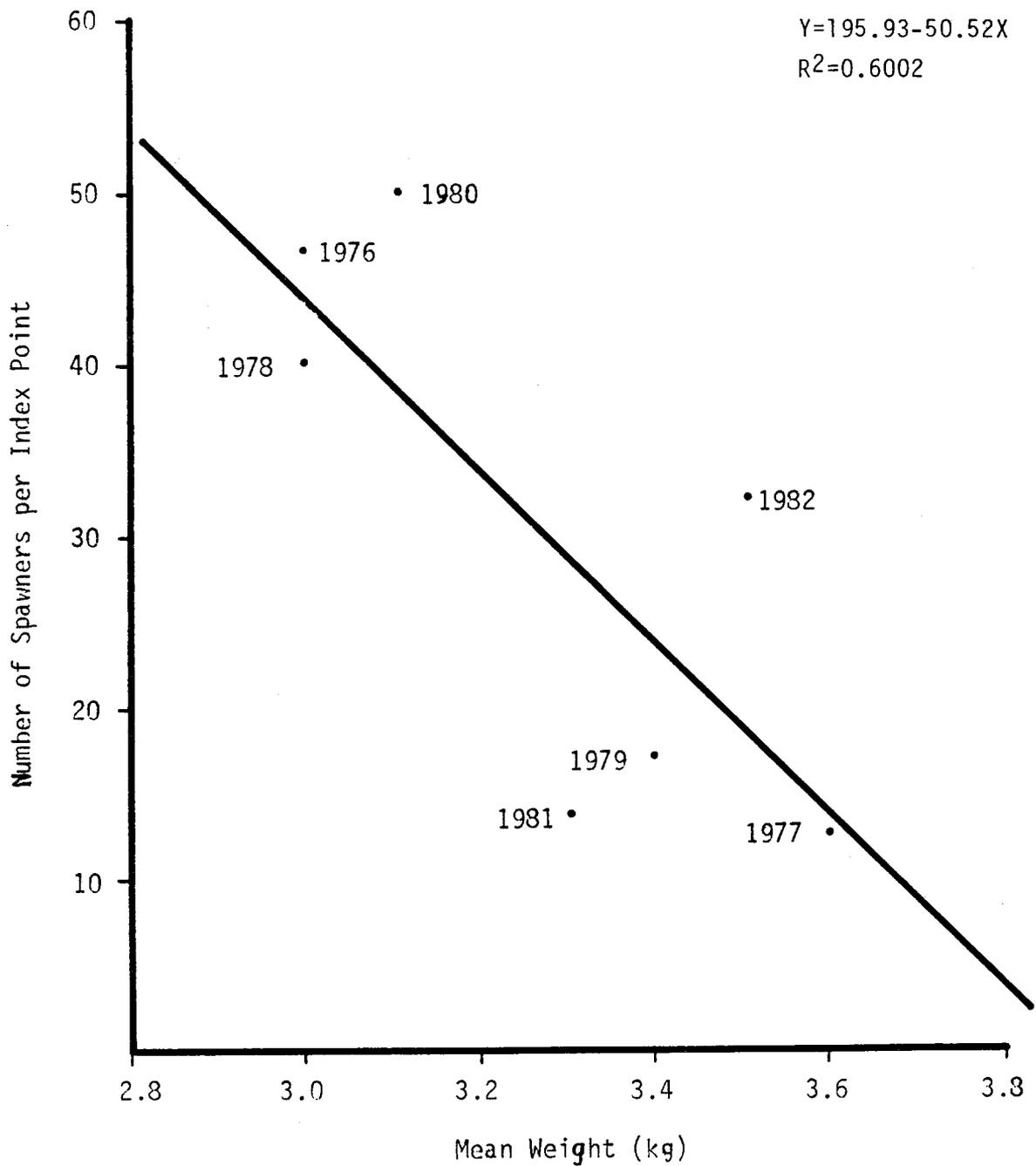


Figure 3. Relationship between mean weight (kg) and number of spawners per test fishing index point for Igushik River sockeye salmon, 1976-1982.

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